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Vol. 11. No. 8. pp. 489-576. August, 1941

THE VETERINARY BULLETIN

1941

IMPERIAL [illegible]GICAL
7 AUG. 1941
INSTITUTE

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Erratum.

Vol. **10.** p. 637. AUSTRALIA, NEW SOUTH WALES. (1939). for "ANTHRAX.—It was found . . . the area" read "ANTHRAX.—In work done to ascertain whether anthrax bacilli multiply in the soil, it was found possible to cultivate the bacilli in a mixture of sheep faeces and soil; an attempt is being made to cultivate the organisms in soil from anthrax areas."

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IMPERIAL BUREAU OF ANIMAL HEALTH

THE

VETERINARY BULLETIN

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DISEASES CAUSED BY BACTERIA AND FUNGI

CHRISTIANSEN, M. (1940). Den praktiske be kaempelse af streptokokmastitis, specielt ved isolationsforanstaltninger. [**Control of Mastitis, Especially by Isolation**].—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 336–357. Discussion pp. 357–368. [In Danish : German summary].

C. reports the result of a control scheme lasting for three years, in which a large herd of 207 cows was examined for udder streptococci and then divided into two groups, 72 uninfected and 135 infected cows. Complete isolation was attained and after two years there were 154 uninfected and 66 infected cows. At the first test, 65% of the infected cows harboured haemolytic streptococci, which remained the dominant type of organism. During the first two years udder infection occurred in 30 cows in the uninfected herd, the haemolytic streptococcus type occurring in 16 of them. During the third year both herds were stricken with foot and mouth disease, which resulted in a flare-up of mastitis cases. Seventy-three out of 129 cows in the uninfected herd became infected with non-haemolytic streptococci. Haemolytic streptococci were not found at all, so that success could be claimed in eradicating the original dominant infection. At the last test the infected herd consisted of 44 cows, of which 36 harboured haemolytic streptococci.

In the discussion, WALL described a technique for examining milk samples for evidence of mastitis. He advocated the slaughter of cows found to be affected with mastitis caused by TB., *Corynebacterium pyogenes*, staphylococci, and human-pathogenic streptococci. Mastitis due to other streptococci and to *Bacterium coli* infection could be treated by the infusion method. Quarters can be dried off by injection through the teat canal of 300 c.c. alcohol and glycerin (equal parts), with a few c.c. of Tinct. Iod. added. W. also gave instances of the course of infection following teat injections of the strangles streptococcus and gave advice on the care of milk cows and the necessity for adequate vitamin B_1.

Other speakers discussed the many practical difficulties met with in carrying out large-scale control of mastitis, *viz.*, the necessity for greatly increased laboratory facilities capable of dealing with many hundreds of milk samples without delay, the difficulties inherent in the farm buildings and personnel, and the difficulties in control of " doubtful " milk.—J. E.

WATTS, P. S. (1941). **Contagious Streptococcal Mastitis of Cattle. Possible Extension of Field Control on a National Scale and the Role of the Practitioner.**—*Vet. Rec.* **53.** 61–66. Discussion pp. 66–71.

The chief theme of this paper is that segregation methods alone can seldom be relied upon to eradicate contagious streptococcal mastitis, but that the incidence and severity of the disease can largely be controlled if adequate and consistent measures are taken to limit the spread of infection. It is stated that the success of an eradication scheme depends on (1) the assump-

NOTE :—In certain cases it is not possible to check references in the original publication. Such references are marked with an asterisk.

tion that the causal organism is an obligatory parasite, (2) the detection of infected cattle, and (3) the application of measures to prevent reinfection. With regard to these points it is claimed, although no evidence in support of this contention is given, that the organism is capable of surviving for prolonged periods in the dust of byres and also that the usual plate method of cultivation does not reveal every case of infection. The mastitis control scheme envisaged aims at increasing what is termed apparent herd immunity, the detection and treatment of cattle most likely to be spreading heavy infection, the treatment of all acute cases, and the removal or segregation of all cases which fail to respond to treatment. Each of these measures is discussed in detail.

In the subsequent discussion it was apparent that many speakers shared the experience that breakdowns were frequent in herds in which segregation had been tried and that eradication was almost impossible. Several speakers also referred to the presence of the infection in heifers at calving, but W. thought the suggestion that 15% of such animals were infected was high. He considered 10% to be the maximum figure.—GWILYM O. DAVIES.

SMITH, F. R., & CAMERON, H. S. (1941). **Haemolytic Streptococci Associated with the Bovine Udder.**—*Cornell Vet.* **31.** 24–29.

Milk samples were obtained from individual quarters in a dairy herd during a period of two years, and those organisms capable of haemolysing equine red blood corpuscles were studied. The results of the investigation are presented in a table which does not lend itself to abstracting, but which shows that many of the haemolytic streptococci isolated did not conform to the characters ascribed to the established species.—GWILYM O. DAVIES.

BRYAN, C. S., MOORE, G. R., & CAMPBELL, J. H. (1940). **The Examination of Milk for Streptococci of Mastitis as an Indicator of the Streptococcus Infection of Bovine Mammary Tissue.**—*Vet. Med.* **35.** 166–168.

Milk samples of 94 dairy cows were examined microscopically for mastitis streptococci and P.M. examinations were made of each udder immediately after slaughter; cultures were made from a portion of mammary tissue from each quarter of each udder and examined for growth of streptococci. The results indicate that if streptococci have invaded the mammary tissue they will be present in the milk and therefore the presence of streptococci in properly collected milk samples is evidence of a streptococcic infection of the udder tissue. Two of six heifers that had never lactated were found to be infected, which confirms the opinion of MILLER [*V. B.* **7.** 311.], that heifers may acquire an infection which remains latent until the udder begins to function.—R. A.

CONE, J. F., & GRANT, F. M. (1939). **Improvement of the Hotis Test for the Detection of Mastitis Streptococci.**—*J. Milk Technol.* **3.** 75–79.

The authors found that the bromcresol-purple used in the Hotis test [see *V. B.* **8.** 555.] did not affect the development of streptococci in the samples of milk tested. The method which they now describe is based on this finding; the 24 hours' Hotis test is carried out and smears from all tubes showing doubtful reactions are then examined for long chain streptococci. In 1,434 samples from 37 cows this procedure detected 96·8% of the samples from streptococci-infected quarters and 99·5% of those from quarters free from streptococci. —J. A. GRIFFITHS.

MCCULLOCH, E. C. (1940). **The Rapid Detection of Mastitic Milk by a Portable Electrometric Device.**—*Vet. Med.* **35.** 158–164.

The detection of mastitis by electrometric means was studied. The method is based on the observation that the electrical conductivity of mastitis milk is greater than that of normal milk. The apparatus is small, inexpensive, and readily portable. It employs the principle of Wheatstone's bridge, which is used for the measurement of resistances, and a milk cell of standard size is incorporated into one arm of the bridge. Radio earphones are worn by the operator, who milks directly from the cow into the milk cell of the apparatus which is adjusted to indicate the degree of electrical conductivity, the correct reading being made on disappearance of a signal heard in the earphones. The whole process occupies only a very short time and the result is known immediately. With practice, quarter samples from about 30 cows can be dealt with in one hour. Comparisons of results with those obtained by titration with silver nitrate or by the use of bromthymol blue show close correlation. For further details of the apparatus the reader is referred to the original.—D. D. OGILVIE.

VAN DORSSEN. (1939). Over de aetiologie van

den goedaardigen droes. **[Aetiology of Benign Strangles].**—*Tijdschr. Diergeneesk.* **66.** 716–730. [English, French and German summaries].

The author describes investigations on 80 samples from horses with strangles. *Streptococcus equi* and *Str. pyogenes* were isolated.

Str. equi was generally found in the abscesses and *Str. pyogenes* in the nasal discharge. The disease can be set up with the discharge from affected animals, but not with a filtrate of this material. While a culture of *Str. equi* will set up the disease, *Str. pyogenes* causes only an uncomplicated rhinitis.

Str. equi was found to be slightly virulent for rabbits and for mice. The author suggests that *Str. equi* is the causative agent of strangles, and that measures should be taken against this organism to combat the disease.—L. Tobback.

Andrieu, A. (1939). La immunización del cobayo contra el carbunclo. **[Immunization of G. Pigs against Anthrax].**—*Rev. Med. vet., B. Aires.* **21.** 115–122.

A number of vaccines of different degrees of attenuation and virulence were used for intradermal inoculations. It is stated that the degree of immunity conferred depended upon the number of organisms injected and not on the degree of their virulence or attenuation.—M. W.

Hermansson, K. A. (1940). Könstuberkulos hos nötkreatur och intrauterin tuberkulös infektion hos nötfoster. **[Uterine TB. in Cattle and Intra-uterine TB. of the Foetus].**—*Skand. VetTidskr.* **30.** 597–628. [English summary].

This is the report of a study, with case records, of congenital TB. in the calf, based on 42 cases of uterine TB. in slaughter cows. In 33 of the cases tuberculous changes were also noticed by macroscopic examination of the foetus, but no such changes were observed in the other nine foetuses, which were all under five months of age.

P.M. examination of the cows showed that in no case was the uterus or genital tract the sole site of infection. In 13 cases, TB. was generalized, in 25 cases there was also TB. of the lungs, in 30 cases TB. of the pleura, in 27 cases TB. of the peritoneum, and in 8 cases TB. of the udder. In 23 cases there were tuberculous necrotic lesions of the uterine wall and in 19 cases the cotyledons were grossly affected.

The commonest site of TB. in the 33 foetuses was the hepatic lymph nodes (in all 33 cases); in 20 the mediastinal l.nn. were also affected, in 14 the bronchial l.nn., in 12 the liver, and in 2 the lungs.

Pathogenesis is discussed. Tuberculous infection can evidently arise as part of a haematogenous generalized TB., or may be secondary to peritoneal TB., *via* the uterine tube. The calf becomes infected through the foetal placenta. It is interesting to note the rarity of generalized TB. in the foetus, in view of the fact that there is a ductus venosus in bovines. In spite of this, however, it seems that practically all the blood entering the foetus in the umbilical veins passes through the liver, so that the primary site of infection is this organ and its l.nn.

It appears probable that there is a relationship between the time of infection of the uterus and of conception. The latter must perhaps take place before, or not long after the former, otherwise there would arise uterine TB. resulting in sterility. On the other hand, pregnancy may become established and the uterus may be infected during its period, but up to what stage of pregnancy this may occur is not known. H. obtained some evidence that a foetus infected at an early stage is aborted, and that a calf may be born uninfected from a tuberculous uterus.—J. E.

T'ung, T., & Wong, S. C. (1940). **The Incidence of Tuberculous Infection among Dairy Cattle in Peking.**—*Chin. med. J.* Suppl. No. 3. pp. 439–445. [In English].

A modified form of Seibert's P.P.D proved to be a suitable tuberculin for the ophthalmic test in cattle; the optimum dose was 0·2 mg. which gave the maximum reaction in 24 hours. Among 1,210 cattle tested, 18·3% were positive reactors; this total included 604 milch cows of which 26% reacted positively. The incidence of infection as indicated by the test was 27·7% among cattle of foreign breed and only 7% among Mongolian cattle.—R. Allcroft.

Bongert, J. G. (1939). Tuberkulosefreie Aufzucht der Kälber und des Jungviehs. **[Rearing Young Cattle Free from TB.]**—*Tierärztl. Mitt.* **20.** 485–490.

B. gives advice on how to protect calves against TB. If milk is heated to remove infection it should be supplemented by green food containing vitamin C. When about eight days old, calves should be tuberculin tested and the reactors slaughtered.

A thermostatically controlled electrical

apparatus designed for heating milk in the ordinary milk churn is described. The heating elements are enclosed in a container filled with a glycerin solution; this container is star shaped or fitted with flanges and acts as a stirring rod. With this apparatus it is claimed that heating of milk to the required degree and no higher is achieved.—H. E. HARBOUR.

HARBOUR, H. E. (1941). **Avian Tuberculosis in Cattle.**—*Vet. Rec.* **53.** 79–81.

This is a brief review of present-day knowledge relating to avian TB., its transmission to cattle, and the diagnosis of infection in these animals. It is stated that the incidence of TB. in poultry in North Wales was very high, about 20% of adult birds received at Bangor for P.M. examinations being diseased. In view of the prevalence of the disease, the large number of tubercle bacilli excreted in the faeces of affected birds, and the claimed viability of the organisms in the soil for two years or more, the risk of cattle becoming infected was apparently very great. It was generally agreed, however, that avian TB. as a rule produces only a local retrogressive infection in cattle, its most important aspect being that the infection may cause confusion in the interpretation of the results of tuberculin testing. There is no doubt that cattle exposed to avian infection may become highly allergic to mammalian TB., but this sensitivity tends to disappear within 6–12 months after exposure to infection has been removed. Cattle so sensitized usually give a more marked reaction to avian than to mammalian tuberculin, and sensitivity to the former persists longer than to the latter. H. concludes by discussing the importance and the methods of distinguishing bovine and avian infection.
—GWILYM O. DAVIES.

CREECH, G. T. (1940). **Bovine Type of Tuberculosis in Sheep.**—*Amer. J. vet. Res.* **1.** 23–25.

Most cases of TB. in sheep have been found to be due to the avian type of tubercle bacillus. Of 60 cases investigated at the Pathological Division, United States Department of Agriculture, 59 were caused by the avian type bacillus. The remaining one was caused by a bovine type bacillus. A brief account is given of observations made on this strain.

WHITEHEAD, H. G. (1940). **Bacteriological Diagnosis of Tuberculosis. Further Comparisons of the Efficiency of Smear, Culture and Guinea Pig Inoculation in the Detection of the Tubercle Bacillus in Clinical Practice.**—*Amer. Rev. Tuberc.* **42.** 795–800. [Author's summary copied *verbatim*].

1. Tubercle bacilli were found in 321 of 3,046 specimens of various materials submitted for examination from the wards and clinics of the Johns Hopkins Hospital during a period of three years.

2. The materials were studied by smear, concentration and culture in all cases and, in addition, by animal inoculation in half of the cases.

3. An analysis of the results has been given in four tables and a comparison has been made of the relative efficiency of the methods of diagnosis.

4. For maximum efficiency in diagnosis all methods should be used, including several different types of media. Discrimination in the choice of concentrating methods, with the character of the specimen as a primary consideration, should be employed more extensively.

WOODRUFF, C. E., & KELLY, R. G. (1940). **Growth of Tubercle Bacilli in Tissues of Normal and Allergic Guinea Pigs.**—*Amer. Rev. Tuberc.* **42.** 782–794. [Authors' summary copied *verbatim*].

By the use of spread preparations of the guinea pig omentum it has been shown that virulent tubercle bacilli, after intraperitoneal inoculation, are first subject to phagocytosis by polymorphonuclear leucocytes. On the fourth day after inoculation certain of the bacilli are found growing freely on the omental cells, without interference from the ordinary defense mechanisms of the body. Beginning with the seventh day these bacilli are again subject to polymorphonuclear cell phagocytosis. For want of a better term the bacilli found during the four- to seven-day interval have been called *freely growing bacilli.*

Freely growing bacilli have been found in 92 per cent of the omenta of guinea pigs inoculated with recently isolated cultures of virulent tubercle bacilli. Old cultures, even though still virulent for guinea pigs, often fail to show the free growth period after intraperitoneal inoculation. Freely growing bacilli have never been found following the inoculation of avirulent acid-fast bacilli.

Freely growing bacilli have never been found in the omenta of guinea pigs which were already allergic at the time of the intraperitoneal inoculation. It is believed that the inability of

tubercle bacilli to grow freely in association with allergic tissues is one of the important factors in the relative immunity to tuberculosis of the allergic animal.

STEENKEN, W., Jr. (1940). **Effect of Egg Oil on Tubercle Bacilli. A Study on the Growth and Macroscopical Appearance of Tubercle Bacilli Variants of H37, R1 and Undissociated Strains.**—*Amer. Rev. Tuberc.* **42.** 422–425.

It is noted that variant colonies of *Mycobacterium tuberculosis*, H37, and R1, when subcultured on to Corper's egg medium, frequently showed a proportion of smooth colonies where the micro-organisms chanced to seed themselves in oil drops on the surface of the medium, even though the original cultures were completely rough. A clear oily liquid extracted from eggs was added to the surface of various types of solid media, which were then sown with different strains of *Mycobact. tuberculosis*. The colonies developing on parts of the surface free from oil differentiated in the usual manner, whereas those in proximity to the oil were invariably smooth. The addition of the egg oil to cultures prior to seeding produced a smooth, creamy growth.—R. E. GLOVER.

*SCHOOP, G. (1940). Das Bacterium pyogenes bei Rehen und Hirschen. [*Corynebacterium pyogenes* **Infection in Wild Deer**].—*Dtsch. tierärztl. Wschr.* 253–255. [Abst. from abst. in *Zbl. Bakt. I. (Ref.).* **138.** 390].

C. pyogenes is not rare in wild game in Hesse. It was demonstrated in 12 roe deer, two fallow deer, and one red deer. The changes caused sometimes originate from small wounds, but usually the internal organs are invaded, the lungs most commonly, then the liver, kidneys, seminal vesicles, and bladder. Lung infection seems to be favoured by lungworm infestation. The question of epizoology is discussed; it is supposed that the organism is ubiquitous.

SCHOENING, H. W., PETERMAN, J. E., & GREY, C. G. (1940). **A Study of an Outbreak of Acute Swine Erysipelas in One Herd.**—*J. Amer. vet. med. Ass.* **96.** 714–718.

The authors were able to make a comparatively detailed study of an outbreak of acute swine erysipelas which occurred during September and October, 1939, on a farm in eastern Nebraska. The herd was well managed, but there had been evidence of an unrecognized, low-grade S.E. infection during the previous two years, and an acute outbreak involving several sows in the preceding spring. In the present outbreak, 39 of a total of 74 animals on one part of the farm became clinically affected, and a few days later four of 11 pigs in an adjacent holding became ill. All animals were given 20 c.c. of S.E. serum, but 19 died and many of the survivors remained crippled. *E. rhusiopathiae* was recovered from all tissues in fatal cases. Cultures of the organism or infected spleen were fed to nine pigs, and produced death in six cases and the chronic form of the disease in the other three. "Diamonds" were noted within three days of inoculation.

The authors point out that this disease is becoming increasingly important in certain sections of the U.S.A., and stress the dangers of allowing a low-grade infection to persist unrecognized.—ALASTAIR N. WORDEN.

CECCHI, G. (1939). Tentativi di rendere recettiva la cavia all'infezione da B. del mal rossino. [**Attempts to Infect G. Pigs with** *Erysipelothrix rhusiopathiae*].—*Profilassi.* **12.** 73–77. [French and German summaries].

Material virulent for pigeons did not infect g. pigs when introduced into the conjunctiva after scarification or into the testicle after laceration.

GIBBS, C. S. (1940). **Duck Septicemia.**—*J. Amer. vet. med. Ass.* **96.** 239–242.

A report of an investigation into outbreaks in ducks on four separate farms of a disease resembling keel disease, in that affected birds showed nervous symptoms (dizziness, staggering, etc.). The disease was characterized by pericarditis, petechial haemorrhages, and fibrinous exudate of the thoracic cavity with occasional pneumonic changes resulting in death. Bacteria resembling *Pasteurella avisepticа* were isolated from a number of cases. In order to try to account for the nervous symptoms, G. examined the cultures for toxin formation, but the results were negative. He obtained some success with formalin- and phenol-treated vaccines in the immunization of ducks and ducklings. Rabbits or ducks could be immunized and agglutinins demonstrated in the blood; tests against the rabbit hyperimmune sera gave higher titres than those given by certain duck sera.—S. G. IYER.

FRIEDEWALD, F. W., & HUNT, G. A. (1939). **The Diagnosis of Tularaemia.**—*Amer. J. med. Sci.* **197.** 493–502. [Abst. from

* See page 489.

authors' conclusions].

The blood agglutination is the most constant and reliable diagnostic method after the first week of the disease in human beings. The antigen skin test is positive during the first week of the disease and appears to be highly specific and reliable.

Intracutaneous injections of specific antiserum have been of value in diagnosis in only a small percentage of cases, because of non-specific reactions of control sera. It is always necessary to use a control serum in this test. The opsonocytophagic reaction tends to parallel the blood agglutination in time of appearance and is valuable in differentiating brucellosis from tularaemia, when cross-agglutination occurs.

MEYER, K. (1939). Des relations entre les facteurs antigéniques chez les *Salmonella*. Nouvelle contribution à l'étude des antigènes complexes. [**Relations between the Antigenic Factors of Salmonella**].—*Ann. Inst. Pasteur.* **62.** 282–295.

M. has studied the quantitative relationships between somatic antigenic factors in the salmonella group. It was found that these factors were quantitatively the same in the same species. It was also found that an antiserum containing antibodies for only one antigen, such as factor IV antiserum, reacted with all the somatic factors in an organism. From these findings M. concludes that the different somatic antigens are combined in a chemical complex which gives rise to a number of antibodies. Thus although antibodies combine with their specific antigens they precipitate or agglutinate the whole of the chemical complex of which their specific antigens are a part.

—D. L. HUGHES.

ŠTERK, V. (1940). Pokušaj suzbijanja zaraznog pobačaja ovaca, prouzrokovanog sojem Mlinac (srodium sa B. typhi abdominalis) pomoću mrtve vakcine. [**Vaccination against Infectious Abortion in Sheep with Mlinac's *Salmonella typhi* Vaccine**]. —*Jugoslov. vet. Glasn.* **20.** 84–86. [Abst. from English summary].

Report of an inconclusive experiment in which 180 ewes were vaccinated with a strain of bacteria "closely related to *B. typhi abdominalis*".

CONWAY, E. A. (1939). **Reaction of Lymphatic Tissue of Rabbits to Repeated Injections of *Bacterium monocytogenes*.**—*J. infect. Dis.* **64.** 217–240.

A microscopic study of the blood, mesenteric lymph nodes, and spleen of rabbits injected intravenously with 0·1–0·2 c.c. of a suspension of *Bact. monocytogenes* before and after immunization against the organism, showed that proliferation of lymphocytes in lymphatic tissue played an important part in the production of the numerous macrophages in immune reactions. The essential reactions in rabbits were the same after single and multiple injections of *Bact. monocytogenes*, differing only in time relationships and intensity of the processes. The lengthy discussion includes a criticism of the term "reticulo-endothelial hyperplasia", and the opinions of various authors on the subject are reviewed.—R. O. MUIR.

QUEVEDO, J. M. (1939). Algunos aspectos de la brucelosis. [**Some Aspects of Brucellosis**].—*Rev. Med. vet., B. Aires.* **21.** 135–142.

This is a general discussion of present knowledge of brucellosis, with special reference to diagnosis and immunization.—MILLER WATSON.

—. (1939). Les brucelloses en Afrique du Nord. IX^e^ Congrès Fédération des Sociétés des Sciences Médicales de l'Afrique du Nord. (Oran, 3, 4 et 5 Avril 1939). I. Rapports. [**Brucellosis in North Africa. Ninth Congress of the Federation of Medical Societies of North Africa held at Oran, 3rd, 4th and 5th April, 1939. Vol. 1. Reports**]. pp. 128. Oran, N. Africa: Fédération des Sociétés des Sciences Médicales de l'Afrique du Nord. [8vo] [In French].

These 14 reports by various workers in the field of brucellosis, cover a wide range from epidemiology in various North African countries to clinical and surgical treatment. Brucellosis in animals is dealt with in certain of the papers. The bacteriology of various types of brucella is considered in several of the reports. Vaccination, biological and chemical treatment, and prophylaxis are also reviewed. The bacteriological reports do not present any new additions to present knowledge, but stress the methods favoured by various authors and there is necessarily some overlapping. The individual papers have been dealt with in *Index Veterinarius* and the *Veterinary Bulletin*.

—S. J. GILBERT.

I. MOHLER, J. R., WIGHT, A. E., & LASH, E. (1940). **Benefits of Eradicating Bang's Disease.**—*Misc. Publ. U.S. Dep. Agric.* No. 384. pp. 18.

II. Cotton, W. E. (1940). **The Control of Bang's Disease in Dairy Herds.**—*J. Amer. vet. med. Ass.* **96.** 180–185.

III. Marsh, H., & Welch, H. (1940). **The Control of Bang's Disease in an Experimental Herd of Range Cattle.**—*Ibid.* 473–477.

IV. Plastridge, W. N., Rettger, L. F., & White, G. C. (1940). **Some Observations on the Eradication and Control of Bang's Disease.**—*J. Dairy Sci.* **23.** 755–763.

I. This bulletin published by the United States Department of Agriculture is designed to further the national eradication plan for Bang's disease. It gives figures and a map to show the extent of the disease in the U.S.A. Reasons are given to demonstrate how vitally concerned the dairy industry should be in the eradication of the disease. The need for and success of the eradication plan in beef cattle is also stressed. It is estimated that about 10% of the cattle in the U.S.A. are affected. The lowest percentage in a state was 3% and the highest was 22%. Many of the states where the cattle industry is of the range type had an infection rate as high as some of the dairying states.

It was found that although satisfactory results were obtained when the official programme was applied on an individual herd basis, better results followed eradication on a countrywide or area basis. It is stated that even in badly diseased herds, systematic retesting and good hygiene should result in the eradication of the disease after about four tests. [It must be pointed out that under the U.S.A. Government eradication scheme, positive reactors to the agglutination test are slaughtered and compensation is paid for the loss.]

Among the practical benefits achieved by the eradication programme in herds, are thriftier condition of the animals, an increase of 20–25% in the number of calves, higher milk yields, and a decrease in sterility and udder troubles.

II. C. discusses some of the practical difficulties of applying the U.S.A. Government eradication scheme to dairy herds. A high percentage of reactors in a herd, which must be slaughtered, may make it difficult for the dairyman to keep to his milk contract. These animals have to be replaced and to keep the milk supply up the replacements may be added hurriedly to the herd with subsequent risk of reinfection.

It was found in Alabama that of 368 doubtful reactors to the agglutination test which were retested during a two-year period, 253 became negative, 87 became positive, and 28 remained doubtful. Low-titre reactors which subsequently become negative are probably animals which have overcome a slight infection with *Brucella abortus*.

Good hygiene and efficient disinfection are very important for the eradication of the disease from infected premises. Herd replacements should be isolated from the main herd until they have undergone two negative tests at a two-month or longer interval. It is not advisable to buy in pregnant animals. In C.'s opinion there is little risk of spread of *Br. suis* to cattle from infected pigs. The possible danger of infection from discharging fistulous withers in horses should be borne in mind.

It is considered that calfhood vaccination with a strain of *Br. abortus* of low virulence is giving encouraging results, and it may be a method to be preferred to that of aggln. testing and slaughter where the latter is economically difficult.

The article ends with a brief discussion of the public health aspects of undulant fever in man as contracted from cattle.

III. Beef cattle are normally grazed throughout the year on the range, but when the weather is severe or there is a drought, hay may be fed to them on the ground. They are bred so that all calvings take place in a 60-day period before June 1st. As a result of their experiences with a range herd over a period of eight years the authors conclude :– (1) That the presence of a small number of reactors in a range herd is not a serious menace unless the herd is fed hay during the winter, when a serious outbreak of brucellosis may result. (2) That the infection can be eradicated by removing all the reactors (1 : 50) in two annual tests. To achieve this, however, the calvings must all take place within 60 days of each other and the tests be performed 3–4 months after the birth of the last calf. Replacement calves should be vaccinated.

IV. This article is based on eradication work carried out from the Storrs Experimental Station, Connecticut. It covers work done from 1925–39. In this period the number of agglutination tests performed annually rose from 2,378–42,700, the number of herds from 27–624, and the number of herds passing one or more negative tests from 4–473. The average incidence of infection at the time of the initial tests was about 25%. The number of

suspicious reactors which subsequently became positive was greatest in those herds in which the spread of infection was rapid. Of 149 infected herds, 64·8% required from 1–2 tests for eradication, 22·7% from 3–4 tests and 12·7% more than four tests.

The most common cause of reinfection was found to be contact with infected animals introduced into the herd or by animals breaking in or out of the pastures. Infected horses and swine caused some breakdowns and in some cases infection was caused by persons going directly from infected to clean herds.—D. L. H.

FLATLA, J. L. (1939). Brucellainfeksjon hos hest. **[Brucellosis in Horses].**—*Norsk VetTidsskr.* **51.** 37–51. [English and German summaries]. [Abst. from English summary].

A general account of brucella infection in horses is given, and four cases are described of lesions in the withers in horses which gave positive reactions to the agglutination test. In two of them bacteria which were isolated from bursal enlargements associated with these lesions were shown morphologically and serologically to be brucella. As a connexion could be shown to exist between these cases and brucellosis in cattle, and as *Br. abortus* is probably the only type of brucella occurring in Norway, the bacteria found are presumed to be *Br. abortus*. Determination of type, however, was not undertaken.

BURKY, E. L., THOMPSON, R. R., & ZEPP, H. M. (1939). **The Rôle of Brucella in Human and Animal Ocular Disease with Special Reference to Periodic Ophthalmia in Horses.**—*Amer. J. Ophthal.* **22.** 1210–1217.

These studies were undertaken partly on account of the resemblance of periodic opthalmia of horses to recurring uveitis in human beings. A relationship between periodic ophthalmia and the oestrous cycle also suggested itself, and various studies were carried out to establish an aetiological agent in the ovaries or genital tract.

Two mares selected for the studies were both found to have agglutinins for brucella in serum dilutions of 1 : 320. One of these animals was destroyed and brucella were isolated from an ovarian cyst and from the milk. [No record of attempts to isolate brucella organisms from the eye.] Brucella were also isolated from the milk of the second mare. The organisms were also recovered from cystic ovaries of another animal and from ovarian cysts in a further case, neither of which had agglutinins in the blood. Not all cases examined revealed brucella infection, but contributory evidence of a relationship to such infection is described.

Thirty rabbits were inoculated into the anterior chamber of the eye or intravenously, and 12 g. pigs intravenously, with broth culture. Varying ocular lesions occurred and some of these showed resemblance to periodic ophthalmia. The authors suggest that brucella may be the cause or one of the causes of periodic ophthalmia and that brucella infection may play an important role in human ocular pathology.

[No description of technique is given nor were any of the strains isolated typed.]—S. J. G.

I. MCNUTT, S. H. (1939). **Brucella Infection in Swine.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass., 1938.* pp. 90–97.

II. FELDMAN, W. F. (1939). **Discussion on Dr. S. H. McNutt's Paper "Brucella Infection of Swine".**—*Ibid.* pp. 98–99.

Swine can be artificially infected with *Br. abortus*, but the infection is of short duration and except for agglutinins in the blood, symptoms are rarely observed. Pigs in contact with *Br. abortus* infected cattle have shown no ill effects. They are more easily infected artificially with *Br. melitensis* and this organism appears to be more dangerous to swine than *Br. abortus*. Pigs easily contract infection with *Br. suis*, and this type may also infect cattle but rarely sheep. Although abortion is one of the symptoms of *Br. suis* infection in swine, it does not occur in the larger proportion of cases, and *Br. suis* is not the cause of the majority of the abortions occurring in these animals. Attempts at immunization by means of vaccines have not been successful. The agglutination test has proved useful in eradication work. A reaction in a dilution of 1 : 25 is said to indicate a positive case. When sows are infected there are a large number of dead pigs in the litters. Sows with *Br. suis* infection may become temporarily sterile or there may be pyometra in which the organism is present. In one survey, 16% of all pyometra cases in pigs were due to *Br. suis*. The disease may assume an acute form in old boars in which there is stiffness and pain with high temperature and loss of appetite. Orchitis and infections of the bones and joints also occur.

Of the strains isolated from human beings in

Minnesota and Iowa two-thirds were *Br. suis*, about one-third *Br. abortus*, and an occasional one *Br. melitensis*. Human beings contract infection from handling infected pigs' carcasses, the organism being more pathogenic for man than *Br. abortus*. Non-pasteurized milk from *Br. suis* infected cows caused an epidemic of undulant fever.

Fay in his discussion of the paper, referred to vertebral lesions in swine in which he found *Br. suis*, and to the variability of the lesions which may be present in infected swine; he also stated that the organism may be recovered from tissues which appear to be normal or as Creech, Thomsen and others have shown, lesions may be found in parenchymatous organs, the subcutis and tendon sheaths, as well as in the lymph nodes.—J. A. Griffiths.

Onetto, E., Canessa, E., & Leyton, G. (1938). Infección espontanea en cuyes y conejos por *Brucella suis* (1). [**Spontaneous Infection of G. Pigs and Rabbits with *Br. suis*. I**].—*Rev. Inst. bact. Chile.* **6.** No. 3–4. 41–47. [English and French summaries].

An outbreak is described of *Br. suis* infection in a colony of rabbits and g. pigs. The g. pigs were the most severely affected, non-reactors which were isolated showing infection a month or two later. It was believed that the infection was introduced by a number of g. pigs brought in from another colony where they had been in contact with pigs. The infection had probably been present for some time, but the rapid epidemic had existed for only a few months, judging by the sudden increase in the number of abortions, deaths of the young, and sterility in the females. Serological and cultural investigations confirmed the diagnosis. The pathology and histopathology are described at some length, the lesions in many cases being unusually extensive and varied.

*Eimer, K. (1940). Die Bangsche Infektion. [**Undulant Fever**].—*Z. ärztl. Fortbild.* pp. 886–888. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **138**. 865–866].

Undulant fever is prevalent in northern Germany and in the Scandinavian countries, where herds of cattle are infected with brucellosis to an extent of up to 50%. Veterinary surgeons and farmers contract infection by contact, and town-dwellers through milk. In Germany about 30% of market milk is infected with *Br. abortus*. Only suitably predisposed persons become clinically affected, whilst children very seldom do. Undulant fever contracted from swine is clinically more severe than that contracted from a bovine source. Diagnosis and vaccination are also referred to in this paper.

Evans, A. C., Robinson, F. H., & Baumgartner, L. (1938). **Studies on Chronic Brucellosis. IV. An Evaluation of the Diagnostic Laboratory Tests.**—*Publ. Hlth Rep., Wash.* **53.** 1507–1525. [For previous parts, see *V. B.* **8.** 693].

Agglutination, allergic, and opsonocytophagic tests were made on human beings; chronic brucellosis appeared to be the logical diagnosis in 28 cases. The results were compared with similar tests of 14 recovered cases with a history of acute brucellosis within the previous 14 years, four cases of acute brucellosis, 41 cases of possible chronic brucellosis, 321 cases of other chronic diseases, and 28 healthy subjects. Brucella cultures were obtained from seven of the 28 cases of chronic brucellosis. From a careful analysis of the data it appeared that no single test (other than isolation of brucella) can be relied on to determine infection. An aggln. titre of 1 : 40 was found to be the minimum suggestive of brucellosis. 46% of the 28 cases of chronic brucellosis and four of the seven cases from which brucella were recovered gave a negative aggln. reaction. A positive aggln. reaction is, however, regarded as evidence of infection. A positive skin reaction may be regarded as suggestive of infection in chronic cases while being less reliable evidence than a positive aggln. reaction. A positive skin reaction was more usual in cases with a history of past brucellosis (92·8%), whereas aggln. tests were positive in only 28·6%. The opsonocytophagic reaction was found to be the least reliable of the specific tests. Cases of brucella infection may occur in which all three specific tests give negative results. Two of the cases from which brucella were isolated reacted negatively to the three specific tests.—S. J. Gilbert.

*Awetikjan, B. G. (1939). **Rate of Growth of Various Brucella Strains.**—*J. Microbiol., Moscou.* No. 7/8. pp. 94–98. [In Russian]. [Translation of abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 367].

Br. suis multiplies more rapidly than *Br. melitensis* or *Br. abortus*. The two last organisms cannot be differentiated by growth rate.

del Vecchio, V. (1938). La differenziazione delle brucelle nei terreni Petragnani-

tionina e Petragnani-fucsina. **[Differentiation of Brucella on Petragnani's Thionin and Fuchsin Media].**—*Ann. Igiene (sper.).* **48.** 717–732. [Abst. from author's conclusions].

On Petragnani's medium plus thionin, *Br. melitensis*, *Br. paramelitensis*, *Br. suis*, and *Br. parasuis* grew, but not *Br. abortus* or *Br. paraabortus*. On Petragnani's medium plus fuchsin *Br. melitensis* and *Br. paramelitensis* grew, but the others did not. The trypaflavine agglutination test is of further value for differentiation, positive aggln. occurring with the three *para*-variants only. Indole is not produced by any species of *Brucella*. The bacteriostatic action of glycerin-potato medium is least for *Br. abortus*, increases for *Br. suis* and is greatest for *Br. melitensis*. H_2S is produced by all *Brucella* species on media containing reducible S.

*Anina-Radtschenko, N. D. (1939). **Catalase Reaction in the Brucella Group.**—*J. Microbiol., Moscou.* No. 7/8. pp. 105–111. [In Russian]. [Translation of abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 868.]

The examined brucella strains (12 *Br. melitensis*, 7 *Br. abortus* and 1 *Br. suis*) foam on the addition of H_2O_2. The catalase reaction occurs even with a weak suspension of 100 bacilli per c.c. The catalytic activity of brucella is destroyed by drying for one day over H_2SO_4, but is not inhibited by distilled water, physiological saline, or glycerin. Catalytic activity takes place at temperatures between 40°–60°C., is greatly weakened at 70°C., and is destroyed in 5 min. at 80°C. or over.

Pegreffi, G., & Carta, A. (1939). Infezioni da anaerobi nelle pecore sarde. Aspetti anatomici ed indagini batteriologiche. **[Pathological and Bacteriological Investigations on Anaerobic Infections in Sheep in Sardinia].**—*Profilassi.* **12.** 134–137. [English and German summaries]. [Abst. from English summary].

The authors carried out a certain amount of bacteriological work on sheep affected with a disease, previously considered to be bradsot, which causes considerable losses among flocks in Sardinia. Anaerobic bacteria were isolated, but the work was incomplete and no conclusions could be drawn.

Šterk, V. (1940). Oboljenja od plinovitih edema kod domaćih životinja na području Južne Srbije s naročitim obzirom na šuštavac govedi i bradsot ovaca. **[Anaerobic Infection of Domestic Animals in Southern Serbia with Special Reference to Blackleg and Bradsot].**—*Jugoslov. vet. Glasn.* **20.** 271–291 and 319–331. [Abst. from German summary].

Anaerobic infections cause great losses in domestic animals in southern Serbia, the most important types being blackleg in cattle and bradsot in sheep. Blackleg occurs at any time of the year but is most prevalent in the summer, August being the peak month for losses. Morbidity on affected farms is 10–15% and mortality 100%.

Bradsot begins to appear in September, reaches a peak in November, thereafter subsiding until a second peak occurs in April. This incidence seems to be connected with the seasonal availability of rapid grass growth and with great variation between day and night temperature. Morbidity averages 25%, with great variation, and mortality is 50–100%.

Of 32 samples of blackleg material, 20 were due to *Cl. chauvoei* infection, 7 to *Cl. septique* infection, and 5 to both organisms, whilst 13 of 16 bradsot samples were cases of *Cl. septique* infection and 3 were due to Fränkel's bacillus.

—. (1940). **Notes on the Diagnosis and Treatment of Gas Gangrene. With a Suggested Scheme for the Bacteriological Investigation of War Wounds.**—*Med. Res. Coun. War. Mem.* No. 2. pp. 13. 7 appendixes. London: H.M. Stat. Off. [8vo] [3d.]

This memorandum was prepared by the War Wounds Committee of the M.R.C. and the Committee of London Sector Pathologists to furnish a simple synopsis of present knowledge of gas gangrene, to indicate how an extension of this knowledge can best be secured, and to lay down a scheme of minimum procedure for combined clinical and bacteriological examination of war wounds for any hospital or laboratory willing to co-operate in the scheme. The chief anaerobic bacilli are listed and their more important characters are tabulated, together with concomitant aerobic bacteria such as staphylococci, streptococci, *Proteus vulgaris*, *Pseudomonas pyocyanea* and coliform types. *Clostridium welchii* and *Cl. sporogenes* are stated to be the most commonly associated anaerobic species. Recent work has shown that a combination of surgical (anti-bacterial) and serum (antitoxic) treatment with chemotherapy by sulphonamide drugs is most likely to control

gas gangrene with toxaemia.—C. V. WATKINS.

APOSTOLEANU, E., & VLADUIU, O. (1938). Cercetări experimentale în tratamentul gangrenei gazoase la cal. **[Treatment of Gas Gangrene in Horses].**—*Arhiva vet.* **30.** 28–68. [Abst. from French summary].

From studies on 15 natural and eight experimental cases, the authors conclude that surgical treatment is best for gas gangrene. Specific serotherapy was a valuable adjunct, but could not alone save life. It was found necessary to excise all infected tissues in order to prevent a fatal infection. [Particulars of the infective agents and antisera are not given in the summary.]

MONTGOMERIE, R. F. (1940). **The Route of Injection in Active Immunisation of Horses against Tetanus.**—*Vet. Rec.* **52.** 539–540.

M. records the active immunization of 190 horses with two doses of tetanus toxoid given at an interval of four weeks using three methods of injection, *viz*, (a) both subcutaneously (45 horses), (b) one subcutaneously and one intramuscularly (44 horses), and (c) both intramuscularly (101 horses). All the animals were tested for the presence of antitoxins in the blood 14 days after the second injection. The table shows the greater response to immunization when one or, more especially, both injections were intramuscular. The proportion of cases having more than 25 U.S.A. antitoxic units in their blood for each method respectively were (a) 9%, (b) 52% and (c) 60%. Further, the local reaction set up by the intramuscular injections was less disturbing to the horses than that caused by the subcutaneous injections.

M. suggests that horses so immunized would constitute an important foundation stock for hyper-immunization if large amounts of tetanus antitoxin were needed in an emergency.

—C. V. WATKINS.

I. RAMON, G., LEMETAYER, E., RICHOU, R., & NICOL, L. (1939). De la production rapide et intensive de l'antitoxine tétanique chez le cheval. Ses conditions —ses conséquences. **[Rapid and Intensive Production of Tetanus Antitoxin in Horses].**—*Rev. Immunol.* **5.** 405–416.

II. RAMON, G., KOURILSKY, R., RICHOU, R., & KOURILSKY, S. (1939). Recherches immunologiques sur la séro-anatoxithérapie tétanique. **[Immunology of Serum-Anatoxin Treatment of Tetanus].**—*Ibid.* 432–450.

III. RAMON, G. (1939). L'immunité conférée par l'anatoxine tétanique chez l'homme et chez le cheval. Précisions d'ordre immunologique et épidémiologique. Conséquences. **[Immunity Conferred by Tetanus Anatoxin on Human Beings and Horses].**—*Ibid.* 477–490.

I. Immunization experiments with 25 horses are described to illustrate the value, in the speedy production of tetanus antitoxin, of previous vaccination, the addition to the antigen of a stimulating substance such as tapioca, and of a shortened period of hyper-immunization. There follows an account of the technical and economic advantages resulting from this modified process of tetanus antitoxin production and also of the therapeutic applications. Most important of these is the possibility of preparing solutions of tetanus antitoxin, the protein content of which would be a tenth to a twentieth of that of the crude horse serum. The authors claim that, after hyper-immunization for 28 days involving only seven injections of antigen, sera can be obtained with a titre of 4,000 antitoxic units per c.c.

II. After a summary of the results obtained by previous workers with serum-anatoxin therapy and a description of the technique in human beings, a comparison is made of the production of antitoxic immunity in four persons by antitetanic serotherapy alone and in 14 persons by serum-anatoxin therapy. The authors contrast the short duration and complete disappearance of the passive immunity obtained by sero-therapy with the persistent though fluctuating immunity produced by serum-anatoxin treatment resulting in an active immunity which is superimposed without transition upon the initial passive immunity and protects the patient against a relapse due to a persistent obscure focus of tetanus infection.

III. An account is given of the results of vaccination with anatoxin against tetanus, carried out in man and horses during the past 12 years. Details are tabulated of the high antitetanic titres of the sera of 145 horses which received two injections at a month's interval of 10 c.c. of tetanus anatoxin containing a small amount of tapioca powder, followed in the majority of cases at the end of a year by a third dose of 10 c.c. The stability of the antitetanic

immunity produced by this method is demonstrated by data of the antitetanic titres of the sera of 126 horses tested throughout eight years after vaccination with anatoxin. No case of tetanus occurred amongst 50,000 cavalry horses vaccinated with tetanus anatoxin, although cases of tetanus had previously persisted when sero-therapy had been practised. Similar results were obtained in 1½ million human beings vaccinated against tetanus.—R. O. M.

COBURN, D. R., & QUORTRUP, E. R. (1939). **Recent Findings in Relation to the Control of Botulism in Waterfowl.**—*Trans. 4th N. Amer. Wildlife Conf. 1939.* pp. 859–868. Washington, D.C. : American Wildlife Institute.

The decomposition products of numerous kinds of marsh vegetation inhibit the growth of *Clostridium botulinum* and consequently are valuable in the control of botulism in wildfowl ; algae, however, are potentially dangerous as after a few years they settle to the bottom to form a tough layer that contributes to the formation of anaerobic conditions, while the decay depletes the oxygen content of the water and provides a medium for the growth of *Cl. botulinum.*

All carcasses of dead birds should be collected and either buried very deeply or burned ; the use of disinfectants on the soil underlying decomposed carcasses is recommended on game farms where birds are confined, but the use of chemicals on marshes should be avoided until further trials have been made as the destruction of bacterial plankton and other life over large areas might create a greater menace than it would eliminate.

Indirect control of the movements of water as affected by wind and direct control by systems of dykes and canals is also important in keeping the water oxygenated and preventing the growth of anaerobic organisms.

FILDES, P. (1940). **Bacterial Nutrition.**—*Rep. Proc. 3rd int. Congr. Microbiol. 1939.* pp. 68–72. New York : International Association of Microbiologists. [In English].

After a summary of the stages leading to the discovery of the first bacterial vitamin, F. viewed with commendation the developing activity in the study of bacterial nutrition in the hope of determining the essential nutrients of bacteria so completely as to make it possible to modify or control bacterial processes in the industrial and medical fields of study. The further hope was expressed that results derived from such bacterial studies could be directly applicable to other forms of life. There followed a review of the discovery of various bacterial metabolites which are tabulated together with the bacteria associated with them. The confusion arising from failure of one worker to confirm the results of another with regard to the indispensability of a substance for a particular bacterial species was assigned to a highly characteristic variation in the nutritive requirements of members of the same species affecting different cultures of the same strain. F. pointed out that the discovery of essential metabolites was only possible for those bacteria which could not synthesize them, and illustrated the synthesis of complex substances from simple ones in a series of steps catalysed by a series of enzymes. Following a discussion of LAIDLAW's conception of a virus as a mere specific nucleo-protein, itself inert and exhibiting the characters of life borrowed from the cell it invades, only passing reference was made to nutritional studies on protozoa, yeasts, moulds, fungi, and animals.—R. O. MUIR.

ERIKSON, D. (1940). **Pathogenic Anaerobic Organisms of the Actinomyces Group.**—*Spec. Rep. Ser. med. Res. Coun., Lond.* No. 240. pp. 63.

This report is a sequel to E.'s systematic study [*V. B.* **4.** 410.] of the aerobic types of *Actinomyces*, and is of much greater interest to the animal pathologist than the first study. The scope of the investigation and E.'s findings are summarized in the following conclusions from the report.

" A detailed study has been made of twenty microaerophilic Actinomyces strains derived from pathological processes, fifteen being of human and five of bovine origin. The fifteen human strains have reacted as one group within which only variations could be demonstrated, whilst the bovine strains have proved almost identical with each other, but different from the human strains. It has been shown that the outstanding differences between the two are as follows : morphologically, a greater degree of polymorphism on the part of the human strains and, in particular, a firm, generally adherent growth on solid media, whereas the bovine strains form more uniform, soft, smooth, colonies ; physiologically, a greater ability to ferment sugars on the part of the human strains ; serologically, a lack of reaction between the two types. A survey of the relevant literature has been made, from which it has appeared that the human type coincides with the original description of Wolff and Israel and with the majority of reported strains of human origin, while accounts of a soft-growing form have occurred preponderantly in the veterinary literature. It has been argued that

A. bovis Harz and *A. bovis* Bostroem as used for the free-growing aerobic forms of Actinomyces are invalid and should be replaced by *A. graminis* Topley and Wilson, and that *A. israeli* Kruse should be substituted for *A. bovis* Wolff-Israel. The fifteen human strains here studied are all representative of *A. israeli*, and the five bovine strains should be regarded as a distinct species—*A. bovis*. A complete lack of serological relationship has been demonstrated between, on the one hand, the anaerobic *A. israeli* and *A. bovis* and, on the other, representative aerobic species, both non-acid-fast and acid-fast, belonging to Ørskov's Group I and II respectively. Despite the difference in physiology, a similarity in morphology has been observed in the case of anaerobes and Group II aerobes; and, systematically, the former could be included as a separate sub-group in Ørskov's Group II or Jensen's genus *Proactinomyces*. Finally, ultrafiltration experiments have yielded no evidence in favour of a hypothetical life-cycle involving either anaerobic or aerobic forms."

[It is interesting to note that all five bovine strains were isolated in Australia from lesions in soft tissues, namely the cheek of an ox, left flank of oxen (two strains), udder and tongue. No strain from "lumpy jaw", the commonest bovine lesion due to *A. bovis* infection in Great Britain, was studied and no anaerobic *Actinomyces* of bovine origin was procurable in Europe.]—Gwilym O. Davies.

Sabin, A. B., & Johnson, Barbara. (1940). **Pathogenic Pleuropneumonia-Like Microörganisms in Tissues of Normal Mice and Isolation of New Immunological Types.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 569–571.

It has been established that at least three distinct types (A, B, & C) of "pleuropneumonia-like" organisms may be obtained from various sites in normal and experimental mice.

The authors examined ten normal and two experimentally infected mice very thoroughly for their presence. Three of the normal mice were free from organisms. Of the remainder, cultures of "pleuro-pneumonia-like" organisms were obtained from the conjunctiva and nasal mucosa, occasionally from the brain, and less regularly from the trachea and lungs. The abdominal organs and the intestines were free.

Two new immunologically distinct types (D & E) were isolated which produce arthritis on experimental inoculation but do not produce a neurotrophic exotoxin. On one occasion three types (A, D, & E) were isolated from the same mouse.—J. S. Paterson.

DISEASES CAUSED BY PROTOZOAN PARASITES

French, M. H., & Hornby, H. E. (1939). **Further Studies in Animal Trypanosomiasis. I. The Effect of Certain Food Supplements on the Course of *Trypanosoma congolense* Infections—II. The Effect of Feeding Iron and Copper Supplements under Field Conditions—III. Note on the Strains of *T. congolense* used in these Studies—IV. Note on Resistance to Treatment.**—*Rep. Dep. vet. Sci. Tanganyika, 1938.* Pt. II. pp. 10–27.

I. Oxen were fed a basal hay ration with a number of different supplements including green stuff, vitamin B concentrates, and minerals containing adequate Fe, Cu, and Co to promote blood formation, and were then inoculated with a very virulent strain of *T. congolense*. Weekly determinations were made of starch equivalent intake, live weight, temperature, and red blood corpuscle counts. As the disease progressed to a certain point antimosan treatment was instituted in the form of five weekly injections. In all cases acute disease developed which, but for the antimosan, would almost certainly have been fatal. This confirmed previous findings that even on good diets the nutritional state alone has little influence on the course of trypanosomiasis in the bovine up to the time of the crisis. Two animals on a diet in which minerals and vitamins were at a very low level succumbed somewhat more rapidly than better fed animals; this was taken as indicative that good nutrition, although of great value after the crisis, is not actually disadvantageous in the early stages of the disease. Green grass when added to a good basal ration had no influence on the course of the infection or on the subsequent rate of recovery after treatment. The provision of the blood-forming minerals did not appear to have any positive effect on the course of the disease and the recovery after treatment, when the basal ration was good.

The nature of the anaemia produced in the course of the disease is discussed. The lowering of the r.b.c. count was a constant finding, although the anaemia as such is not considered to be the actual cause of death. The authors consider the action of the disease is upon the formation of the red cells and not through red cell destruction. Arguments and some evi-

dence in support of this are adduced, and it is considered that some toxin is liberated by the organisms and acts directly upon the haemopoietic tissues possibly by inactivation of some essential unspecified enzyme system.

II. Two groups of animals treated with antimosan or tartar emetic to remove *T. congolense* from their systems were allowed to graze during the day and received 2 lb. cottonseed cake each night, one group receiving 1 g. ferrous sulphate and 0·1 g. $CuSO_4$ in addition. The animals were weighed weekly and blood Hb estimations were carried out each month. There were no differences in live weight increases between the two groups over a period of three months and the improvement in Hb, while slightly in favour of the Fe-Cu fed group [statistical significance doubtful], was not such as to be economical under normal husbandry conditions because the rate of recovery appeared to depend upon the plane of nutrition; when this was high the Fe tonic was without effect and when low the Fe slightly improved the anaemia to a level far below that of complete recovery.

III. In trypanosomiasis studies three strains of *T. congolense* have been used:–(1) Mild—slightly affecting cattle, causing fever and a partial reduction in the r.b.c. count but little or no loss in live weight; goats spontaneously recover from this strain. (2) Virulent—with which two cattle died, three required treatment to save their lives, one recovered spontaneously, while in a seventh the disease ran a chronic course; two sheep died, but a goat spontaneously recovered. (3) Extremely virulent (No. 274)—fatal to untreated cattle and to goats after several passages.

No. 274 strain arose spontaneously in a bull which despite continuous Sb treatment over two years finally relapsed and was destroyed. Inoculation of its blood into other oxen led to three fatal results before treatment was instituted, but in three others antimosan treatment was uneventfully successful although it was a complete failure in the original animal. This tends to bear out the contention that unusual refractoriness to treatment is more likely to be due to host idiosyncracy than to special resistance on the part of the parasite.—Alfred Eden.

Nieschulz, O. (1940). Versuche über die unmittelbare Uebertragung von Trypanosoma congolense durch Stomoxys calcitrans. [**Experiments on the Direct Transmission of** *T. congolense* **by** *S. calcitrans*].—*Arch. Schiffs- u. Tropenhyg.* **44.** 120–124.

N. used 1,150 specimens of *S. calcitrans* in attempts to transmit *T. congolense* from infected to healthy g. pigs by rapid interrupted feeding, the intervals between the feeds on the infected and healthy animals varying from 1–60 sec. Three positive results were obtained, the incubation period being in one case eight days, or only about two days longer than that after blood inoculation. In one series of negative experiments the average intervals between the feeds was 8·5 sec., whilst the positive results all occurred in a series in which the average interruption lasted only 4·5 sec. Whilst living trypanosomes could be found in the guts of the flies for 24 hours after the infecting feed, injection of the gut contents into another animal did not produce infection after three hours.

N. concludes that although *S. calcitrans* can transmit *T. congolense* mechanically, this species can play only a secondary role in nature as it must rarely occur that the feeding interruption is sufficiently short. [This last assumption might be disputed.]—U. F. Richardson.

*Nieschulz, O. (1940). Uebertragungsversuche mit einem südeuropäischen Surrastamm und Stomoxys calcitrans. [**The Transmission of a Southern European Strain of** *Trypanosoma evansi* **by** *S. calcitrans*].—*Zbl. Bakt. I.* (*Orig.*). **146.** 113–115. [Translation of abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 496].

A Bulgarian strain of *T. evansi* was transmitted by *S. calcitrans* from g. pigs to g. pigs by two out of 500 flies and from g. pigs to rats by four out of 150 flies. The interval [for transfer to a new host] was 4·2 sec. for g. pigs and 5·6 sec. for rats. The trypanosomes retained their normal virulence in the intestine of the flies for at least 24 hours.

Katić, R. V. (1940). Prilog poznavanju tryp. melophagium i njene rašírenosti u našoj zemlji. [**Researches on** *Trypanosoma melophagium* **and its Incidence in Yugoslavia**].—*Jugoslov. vet. Glasn.* **20.** 373–384. [Abst. from German summary].

K. reports the results of his observations on seven sheep kept at Zagreb and on 23 mountain and plains flocks from the Prizren region. Sheep keds were present on all the seven sheep. All mountain flocks had an infestation, but many plains flocks were free from the parasite.

Sheep and sheep keds were examined for the presence of *T. melophagium*; it was found in the blood of one lamb out of 251 sheep and lambs examined, and to a proportional extent in the 989 keds (from 312 sheep) examined.

The appearance of the trypanosome from blood, in culture, and from ked material is described [figures very poor]. It was not possible to infect g. pigs or mice with *T. melophagium*.

ACANFORA, G. (1939). La *Castellanella brucei* durante le prime fasi dell'infezione sperimentale. [*Trypanosoma brucei* **during the Early Stages of Experimental Infection**].—*Arch. ital. Sci. med. colon.* **20.** 257–272. [Abst. in *Trop. Dis. Bull.* **37.** 138, copied *verbatim*. Signed: C. M. WENYON].

In a study of the early phases of *Trypanosoma brucei* infection in the guineapig it is found that after subcutaneous injection of infected blood of another animal some of the injected trypanosomes find their way into the blood either by active penetration of the capillary walls or by simple passage through lesions in vessel walls, but the majority pass to the lymphatic glands where they are destroyed. Degenerating forms of trypanosomes can be seen in smears of the glands receiving lymphatics from the inoculation site. The glands thus offer a barrier to the invasion of the blood. Similar results follow intraperitoneal injections, whereas after intravenous injection the lymphatic glands do not appear to play any part in controlling the infection. During all stages of the infection smears of the bone marrow, particularly that of the long bones, show many degenerating trypanosomes, so that it would seem that the bone marrow has a constant action in suppressing the infection.

PEREIRA, C. (1939). **Upon the Detection of *Schizotrypanum cruzi* (Chagas, 1909) Infection in Reduviid Bugs.**—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 365–367. Osaka: Osaka Natural History Society. [In English].

The lid of a 9 cm. × 3 cm. Petri dish is lined with filter paper. The bottom of a 3 cm. × 1 cm. dish is sealed with paraffin wax close to the side of the bottom of the larger dish, and is filled with water, in order to maintain a moist atmosphere.

A reduviid bug, suspected of carrying *Trypanosoma cruzi*, may be transferred immediately after feeding to the filter paper lining. The lid may then be carefully inverted and placed over the dish. The bug will crawl about very slowly so that the drops of faeces fall separately to the bottom, where they remain undried till needed.

Material so obtained may be examined immediately for trypanosomes, or may be utilized for animal inoculation, vital staining, or permanent preparations.—E. S.

CARPANO, M. (1939). La durina in Albania e relative norme generali di terapia e profilassi. [**Dourine in Albania and General Measures of Treatment and Prevention**].—*Riv. Parassit.* **3.** 5–22. [English, French and German summaries].

The existence of dourine in Albania was recorded on clinical evidence in 1933, but the presence of the trypanosome was not demonstrated until 1936. The disease in local animals is very mild, being restricted to scrotal oedema and urethritis in stallions and oedema of the vulva and vaginitis in mares, with the appearance of areas of depigmentation in the region of the vulva and perineum. With recovery, which is the rule, the oedema and depigmentation disappear, but some hypertrophy of the lips of the vulva and of the clitoris persist. Breeding efficiency is not affected. It is believed that the disease has been present in Albania for a long time, and that hereditary immunity has been acquired.

Diagnosis is difficult as the symptoms are not marked. Trypanosomes are not present in the blood, and even when numerous in the vaginal mucus, its inoculation fails to infect g. pigs, rabbits, or dogs. Trypanosomes, however, are often very scarce in the vaginal mucus and prolonged search may be necessary to detect them. C. has found smears stained with Giemsa to be more reliable than fresh preparations. The formol-gel test has given good results, sera being considered positive which show gelification and fluorescence in less than 24 hours. This test gave positive results with the sera of all animals which had recovered from clinically recognizable disease.

Various arsenicals, antimonials, and naganol are curative but it is uncertain whether they are sterilizing, and in most cases animals recover without treatment. It is recommended that expensive drugs be avoided and arsenious oxide be given by the mouth in doses of 1 g. daily. Preventive measures suggested consist of the veterinary inspection of all equines, with treat-

ment or slaughter of affected or suspected animals, control of service, and the protection of stallions in infected areas by the use of naganol or atoxyl.—U. F. RICHARDSON.

MADSEN, D. E., & JENSEN, R. (1940). **Trichomoniasis in the Utah Experiment Station Dairy Herd.**—*Vet. Med.* **35.** 170–175.

This is a report on the course of *T. foetus* infection in a herd of 30 cows and about the same number of heifers. Demonstration of the parasites by direct microscopic examination was unsatisfactory, and the method of cultural diagnosis was used. During the period of observation, 1936–39, 18 cows and two bulls were found to be infected. The course of infection in ten cows is outlined. They had all been sired by the same bull and, although all the evidence pointed to this animal as the source of infection, no trichomonads could be isolated from it either by direct microscopic examination or by cultural methods. Injection of 0·1% aqueous solution of potassium *o*-oxyquinoline sulphate into the urethra and preputial cavity appeared to be efficacious. A condition of granular vaginitis was present in a large percentage of the animals in this herd. The economic loss resulting from trichomoniasis over a period of eight years is discussed.—M. L. BINGHAM.

BELLER, K., & SCHAAF, J. (1939). Durch Geschlechtstrichomonaden des Rindes verursachte Krankheitserscheinungen und ihre klinische Erkennung. [**Clinical Symptoms Caused by Genital Trichomonads in Cattle**].—*Arch. wiss. prakt. Tierheilk.* **75.** 29–39.

As a result of observations on 17 cows and one bull infected experimentally by various methods with genital trichomonads, the authors conclude that artificial infection with pure cultures succeeds when these are injected into the vagina or prepuce, but not when they are injected intravenously. Trichomonads could be demonstrated in the vaginal or uterine mucus for various periods, the longest being ten months after infection by pure cultures, and one year after service by an infected bull. In one case trichomonads were detectable only during a period of 24 days, and in another case they could not be demonstrated until 151 days after the infecting service. Abortion resulted from infection in two cases, pyometra in two cases, and sterility, often associated with absence of heat, in eight cases; in three cases, although infection could be demonstrated, pregnancy was normal and clinical symptoms negligible.

It is considered that coincident bacterial or virus infection is not necessary for the production of disease symptoms, and that the reason for the variation in the reaction to infection must be ascribed to constitutional or environmental variation.

In cows, diagnosis of infection by microscopic or cultural methods is considered fairly reliable, in spite of the evidence produced that no organisms may be demonstrable over long periods. In bulls, however, it is considered that freedom from infection can only be judged on the results of service.—U. F. RICHARDSON.

ENDRESS, R. (1939). Verwertbarkeit dre Komplementbindungsreaktion, der Agglomeration und der Trichomolyse für die Erkennung der Trichomonadeninfektion des Rindes. [**Value of Complement Fixation, Agglomeration and Lysis for the Diagnosis of Bovine Trichomoniasis**].—*Arch. wiss. prakt. Tierheilk.* **75.** 65–82.

For investigations into the value of complement fixation, agglomeration and lysis as methods of detecting cattle infected with genital trichomonads, E. used sera from groups of infected and infection-free cattle under experiment, and from over 400 cattle from infected and non-infected farms.

The antigen used for the c.-f. test was a suspension of trichomonads from cultures, freed from the medium by centrifugation.

Although the sera of experimentally infected animals gave positive results with the c.-f. test, such results were often not obtained for a month after trichomonads could be detected by microscopic examination, and they might become negative in the later stages, although infection could be shown to persist. On the other hand, one bull gave persistently positive results to the test, although trichomonads were only detectable microscopically on one of many examinations; his breeding record left no doubt of his being infected. Animals in which trichomonads were isolated from the blood by cultural methods often gave negative results to c.-f., indicating that the blood trichmonad belongs to a different species.

E. concludes that the results of the c.-f. test substantiate the claims as to the pathogenic importance of *T. foetus*, and considers that it may be valuable as a supplement to clinical

findings, but in the absence of a more delicate antigen it cannot be relied on in practice to detect all infected animals, and nonspecific positive reactions may be given by healthy animals.

Undiluted sera of both infected and healthy cattle cause agglomeration and lysis of cultural trichomonads, and there is not sufficient difference in the activity of diluted sera to render these reactions of any value in diagnosis. —U. F. Richardson.

Levine, N. D., Boley, L. E., & Hester, H. R. (1941). **Experimental Transmission of *Trichomonas gallinae* from the Chicken to Other Birds.**—*Amer. J. Hyg.* Sect. C. **33.** 23–32.

A *Trichomonas* associated with a disease in the upper digestive tract of chickens was reported by Levine and Brandly [*V. B.* **10.** 168, and **11.** 87]. Measured quantities of this organism, cultivated in Ringer-egg-serum medium, were fed to a variety of birds. These birds were killed at intervals following dosing and the upper part of the digestive tract was examined in each case. Other birds were allowed to die before examination. Successful transmissions were made to turkeys, bob white quail, canaries, and English sparrows which all showed characteristic lesions. Only one of 11 treated ducklings exhibited infection. Attempts to infect two ring-necked pheasants and a starling proved futile. As known trichomonads from the upper digestive tract of various birds are of similar structure, and as their easy transmission has been observed from one natural host to another, and to other avian hosts which do not carry natural infections, it is concluded that all belong to a single species, *T. gallinae* [= *gallinarum*].—C. Horton Smith.

Kofoid, C. A. (1939). **The Significance of the Number of Flagella in Trichomonadae.**—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 59–64. Osaka: Osaka Natural History Society. [In English].

K. concludes that the number of flagella in the flagellar complex of a species and in some instances of a genus is constant and characteristic, at least in the flagellates below the hypermastigotes. Seeming variations of the flagellar pattern are due to the progress of changes preceding binary fission. He presents evidence that under some conditions the marginal filament of the undulating membrane may be torn free and may join the anterior group of free flagella. This he believes to have occurred in *Trichomonas gallinarum*, which is thus only an aberrant form of *T. eberthi*. He urges the consideration of all such possibilities in identifying material, in order to avoid confusion of the literature on the group.—E. S.

Hoare, C. A. (1940). **On an *Entamoeba* Occurring in English Goats.**—*Parasitology.* **32.** 226–237. [Author's summary copied *verbatim*].

An amoeba was found in the faeces of ten out of fourteen English goats from three different localities.

The amoeba, of which a detailed description is given, is morphologically identical with *Entamoeba debliecki* of the pig and is therefore included in the same species.

A statistical analysis shows that the caprine strains of *E. debliecki* comprise two races distinguishable from one another by the size of their cysts but identical in all other features.

The caprine amoeba appears to be non-pathogenic.

In view of their bearing upon the systematic position of the parasite of the goat, a critical review is given of the data concerning the various amoebae previously recorded from the pig, goat and some other ruminants.

*Giovannola, A. (1940). I plasmodi aviari. [**Avian Malaria**].—*R.C. Ist. Sanit. pubbl., Roma.* **3.** 217–264. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 490].

G. describes studies of plasmodia of birds. Lists of the various species are given in a series of tables; altogether more than 250 host species and 38 species of plasmodia are recognized. Coloured illustrations are given of some of the more recently described species. The species of mosquitoes which act as carriers are also named and illustrated, with notes on morphology, biology, etc. The bibliography comprises almost 200 references.

*Mudrow, L. (1940). Klinische und parasitologische Befunde und chemotherapeutische Ergebnisse bei der Hühnermalaria. [**Clinical and Parasitological Findings and Therapeutic Experiments with Malaria of Fowls**].—*Arch. Schiffs- u. Tropenhyg.* **44.** 257–275. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 491].

M. studied endothelial schizogony in a strain of *Plasmodium gallinaceum* which had been maintained for 2½ years by blood and mosquito passage. Endothelial forms were found in the organs, especially the brain, of 45 of 150 hens

examined (30%). They were much more numerous in hens which died than in those which were killed, and after mosquito transmission than after inoculation with infective blood. The highest percentage of endothelial forms was found in dead birds infected by mosquitoes. After mosquito infection they were numerous especially in birds dying in the acute stage of the disease, whereas after inoculation with infective blood they were more in evidence in birds in the later phases of the infection. In both groups, the highest mortality coincided with the increase in endothelial forms. Microscopic examination during the incubation period of inoculation-site preparations from hens infected by mosquitoes showed initial stages of sporozoite development, which is completed in endothelial cells, and agrees substantially with the sporozoite metamorphosis of *P. cathemerium* expounded by KIKUTH and MUDROW. Finally, M. discusses the position of forms in endothelial cells in the development cycle of the plasmodia, and their possible relationships with the erythrocytic forms and the sporozoites, as well as the conditions which appear to favour their development.

Chemotherapeutic experiments on the limited efficiency of plasmochin, "certuna", and atebrin on the parasites of fowl malaria, showed ultimately that plasmochin possesses a specific, although slight, influence on the endothelial forms.

*VEZZOSO, B. (1940). L'immunità passiva nell'infezione da Plasmodium gallinaceum. **[Passive Immunity to Infection with *P. gallinaceum*].**—*Riv. Malariol.* **19.** 121–129. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 490].

V. tested the immunizing potency of the sera of hens which had recovered naturally from an infection with *P. gallinaceum* and were in the immune state. For this purpose a series of hens were given various mixed infections, and were treated with varying doses of immune serum, injected intravenously and intraperitoneally once only in two groups and on three successive days in two other groups. The results were negative in all cases.

REICHENOW, E. (1940). Die endothelialen Entwicklungsformen der Malariaparasiten im Lichte der Phylogenie der Hämosporidien. **[The Endothelial Development Forms of the Malaria Parasite in the Light of the Phylogeny of Haemosporidia].**—*Rep. Proc. 3rd int. Congr. Microbiol. 1939.* pp. 139–151. New York: International Association of Microbiologists. [In German].

This is an interesting article discussing the development of the various species of haemosporidia. It is considered that these forms may have developed either from parasites of invertebrates becoming adapted to vertebrate hosts, or by intestinal parasites of vertebrates invading the circulation and then becoming adapted to transmission by invertebrates.

It is pointed out that species of the sub-order Adeleida appear to have originated from parasites of invertebrates and to have become adapted to vertebrates, but that other forms appear to have developed from intestinal parasites.

The progress of adaptation of these intestinal forms is followed from the most primitive form, *Shellackia*, through *Lankesterella*, *Leucocytozoon* and *Haemoproteus* to *Plasmodium*, and it is suggested that asexual development in the endothelial cells is a more primitive condition than that in the erythrocytes, and that the prevalence of endothelial schizogony in some forms of malaria represents a recent adaptation to a new host and a return to the more primitive development cycle. This would explain the high incidence of endothelial invasion when *P. praecox*, a parasite of starlings, is inoculated into penguins.

Some of the malaria parasites seem to be very closely related to *Haemoproteus*, and in an ape infected with *P. kochi*, in which species schizogony in the erythrocytes has never been demonstrated, R. claims to have seen structures in spleen and liver smears which appeared to be schizonts devoid of pigment.

There is some evidence that these endothelial stages occur even in human malaria, and it is argued that the presence of these forms indicates a recent adaptation of malaria parasites to mammals and birds, the original host being possibly some extinct amphibian from which mosquitoes have transmitted the infection to mammals and birds.—U. F. RICHARDSON.

BECKMAN, H. (1941). **An Experimentally Derived Method Determining the Degree of Infection in Avian Malaria.**—*Amer. J. trop. Med.* **21.** 151–157.

Microscopic examination of the peripheral blood of a malarial bird reveals three things of importance in determining the malarious condition, *viz*, mononucleosis, anaemia, and the presence of malarial organisms. The plasmo-

dial population of a few fields is of primary concern. B. has determined the time required to count an arbitrary number of asexual organisms in many slides and, finally, by plotting all the counts, has attempted to group them in such a way that they may be designated by the symbols 1 +, 2 +, 3 +, etc. The work was carried out on 50 female canaries, mosquito-infected with *P. cathemerium*. B. found that a system of plus counting could be established by assuming that the condition was negative if no organisms were found in 3 min.; 1 +, if less than 20 organisms were counted in 3 min.; 2 +, if 20 organisms were counted in 2–3 min.; 3 +, if 20 organisms were counted in 1–2 min.; 4 +, if 20 organisms were counted in 30–60 sec., and 5 +, if 20 organisms were counted in 30 sec. or less. This method appears to be a quick and reliable method of determining the comparative degree of infection.—C. HORTON SMITH.

HEGNER, R. (1939). **Invasion of Young and Mature Erythrocytes by Malaria Parasites.**—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 9–14. Osaka: Osaka Natural History Society. [In English].

It has sometimes been noticed that young trophozoites are practically all to be found in young red cells. H. tested by studies of infection in birds, in man, and in monkeys, the hypothesis that mature erythrocytes are immune. Brilliant-cresyl-blue staining of fresh blood to show up the reticulocytes was followed by the usual Giemsa method.

The bird parasites studied and the results obtained were :– *Plasmodium cathemerium* in the canary, 70% of the merozoites entered newly formed reticulocytes, although these comprised only 8% of all the red cells; *P. relictum* in the canary, 98% of the merozoites entered young red cells; *P. relictum* in the pigeon, 96% of ring-stage parasites in a natural infection were in young red cells; *P. relictum* in the chick, 78% of ring-stage parasites were in young red cells; *P. circumflexum* in the canary, 94·7–100% of merozoites entered young red cells; *P. circumflexum* in a wild red-winged blackbird, 98% of ring-stage parasites were in young red cells, and *P. elongatum* in the canary, 97·8–100% of ring-stage parasites were in young red cells. H. believes that many investigators have taken no note of the type of cells invaded, since there are so many illustrations of young parasites in old red cells.

—E. S.

WOLFSON, F. (1940). **Exo-Erythrocytic Schizogony Associated with the Wood-Thrush Strain of *Plasmodium cathemerium* in Relation to the Species of the Host.**—*Amer. J. Hyg.* Sect. C. **31.** 26–35.

A series of experiments is described in which *P. cathemerium* was inoculated into ducks. After passage in the ducks and several other hosts, the plasmodia were inoculated into canaries.

The following findings are reported from the examination of 100 canaries, observations being made both on the behaviour of the parasite in inoculated blood, and in the tissues. (1) Exo-erythrocytic schizogony is found in infected canaries but not in infected ducks. (2) Passage of infection through ducks, prior to the infection of canaries, appears to prevent the development of exo-erythrocytic schizogony. (3) Direct inoculation of canaries from infected pigeons causes exo-erythrocytic schizogony to develop in only 50% of cases. (4) Exo-erythrocytic schizogony does not appear to affect the rate of mortality. (5) Infarcts and enlargements of the spleen and haemorrhage in the membranes of the brain occur more frequently among canaries exhibiting exo-erythrocytic schizogony.

—G. C. BRANDER.

REICHENOW, E. (1940). Ueber das Kokzid der Equiden Globidium leuckarti. **[The Equine Coccidium, *G. leuckarti*].**—*Z. InfektKr. Haustiere.* **56.** 126–134.

R. records the detection in the faeces of a donkey of oocyst-like structures, which he concludes are the oocyst form of *G. leuckarti* because of their resemblance to the unripe macrogametes of this parasite, which KUPKE described from the small intestine of horses.

Flotation methods of concentrating oocysts were of no value in the case of this species as their specific gravity was so high that they sank in concentrated salt solution. In spite of this difficulty R. was able to obtain sporulated specimens for examination, and he found that the ripe oocyst contained four sporoblasts, each containing two sporozoites. This arrangement is typical of the genus *Eimeria*, and it is considered that *Globidium* should be regarded as a subgenus of *Eimeria*. Sporulation was effected when faeces were incubated at 22° or 26°C., with or without the addition of potassium bichromate, the process being completed in 2–3 weeks. When potassium bichromate was added, the oocyst wall became softened in the process of sporulation, and could be recognized

as consisting of an outer pigmented layer and an inner shell. The measurements of the oocysts are given as 80–87·5μ by 55–59μ, the wall being 6·7–7μ, and the inner shell about 1μ thick. The micropyle opening measures 6μ, the canal running only through the outer layer of the oocyst wall.

It is considered that in view of this observation, and of the previous investigations of CARINI on *E. travassosi* from *Dasypus sexcinctus*, *Globidium* can be accepted as a subgenus of *Eimeria*, being characterized by the thick wall of the oocyst and the development of the gametocytes in giant cells of the subepithelial tissue. The genus may include *G. cameli* of dromedaries and *G. gilruthi* of sheep, the oocyst of which may be the form which has been named *E. intricata*.

As regards pathogenicity, it is noted that the infections recorded by KUPKE occurred in foals which had died suddenly, that NAVEZ recorded the infection in foals with diarrhoea, and that the donkey observed by R. had diarrhoea and was emaciated, recovery being concurrent with the disappearance of oocysts from the faeces.

—U. F. RICHARDSON.

I. YAKIMOFF, W. L., & MATSCHOULSKY, S. N. (1939). **On a New Coccidium from Camels,** *Eimeria dromedarii* **n. sp.**—*J. R. micr. Soc.* **59.** 26–29. [Probably identical article in Russian appeared in **Rev. Microbiol., Saratov.* **18.** 196. (1940)].

II. YAKIMOFF, W. L., MATSCHOULSKY, S. N., & SPARTANSKY, O. A. (1939). **On a New Coccidium from Reindeer,** *Eimeria arctica* **n. sp.**—*Ibid.* 30–31.

I. The material containing the new species was obtained from four camels in the Leningrad Zoological Gardens. The oocysts found were of two kinds, round and oval. Two important features distinguish these forms:–(a) the presence of a sporocystic residue and the absence of a cap in the round form (*E. cameli*), and (b) the presence of a cap and no residual body in the oval form. The oval forms, now named *E. dromedarii*, complete their development in 15–17 days when cultivated in 2% potassium bichromate solution at 10°–12°C.

II. The species is regarded as new on the grounds of oocyst characters. In dimensions these oocysts resemble those of *E. mühlensi*, but differ in shape, being oval, and in the possession of pointed Schneider's bodies in the sporocysts. This is the sixth species found by Y. in reindeer.

[No doubt a further paper will describe other essential features such as the region of the intestine affected, sporulation time, etc.]

—C. HORTON SMITH.

*CHEISSIN, E. (1937). **Some Data on the Influence of Diet on the Infection of Rabbits with Intestinal Coccidia and on their Mortality from Coccidiosis.**—*Trans. Pasteur Inst. Leningr.* **3.** 20–29. [In Russian: English summary p. 125]. [Abst. from abst. in *Bull. Inst. Pasteur.* **37.** 926–927].

C. found that diet had no effect on the susceptibility of rabbits to experimental infection with *Eimeria magna*, *E. perforans*, or *E. stiedae*, but that the mortality from the disease varied with different types of feeding. When given a mixed infection of *E. magna* and *E. perforans*, death resulted in all cases in animals on strictly vegetable diets, in one out of six of those receiving milk, and in three out of seven of those receiving [? animal] protein diets. With *E. stiedae* infection the mortality [whether heavy or light not stated] was the same for all diets except when a very small infective dose was given, in which case those on the vegetarian diet succumbed showing gross intestinal lesions, while the majority of those fed otherwise survived.

THOMOFF, Z. (1938). Prinos km piroplazmoznitê zavolyavaniya u nas. [**Piroplasmosis in Bulgaria**].—*Vet. Sbir.* **42.** 91–100. [Abst. from French summary].

T. studied the morphology of piroplasms from cattle in Bulgaria. *Babesia bigemina* and *B. berbera* were found and a case of *Theileria dispar* infection was seen.

OBITZ, K. (1938). W sprawie krwawego moczu (babesielozy) bydła w Polsce. [**Babesiasis of Cattle in Poland**].—*Pam. pańs. Inst. nauk. Gosp. wiej. Puławy.* No. 2. 84–90. [English summary]. [Suppl. to *Wiad. weteryn.* **18.** No. 223].

The incidence of the disease is very high; in one county 46·2% of bovines were affected and 11% died. The article is largely of a clinical nature and no new information is presented.

OBITZ, K. (1938). Dermacentor reticulatus (Fabr.) i kwestia piroplazmy koni w Polsce. [*D. reticulatus* **and the Problem of Equine Piroplasmosis in Poland**].—*Pam. pańs. Inst. nauk. Gos. wiej. Puławy.* No. 2. pp. 80–83. [English summary].

[Suppl. to *Wiad. weteryn.* **18.** No. 223].

O. discusses the role of *D. reticulatus* in the transmission of piroplasmosis, and he refers to differentiation of this disease from equine infectious anaemia. No new information is given.

BARBONI, E. (1936). Forme a rosetta o a mora (corpi di de Gasperi) e forme anaplasmoidi nel ciclo di evoluzione di *Nuttallia equi.* [**Rosette Forms, Mulberry Forms (de Gasperi Bodies) and Anaplasmoid Forms in the Development Cycle of** *Babesia equi*].—*Riv. Biol.* **18.** 85–89.

B. studied cases of *B. equi* infection in the region of Agro Perugino. In Giemsa-stained preparations of peripheral blood, piroplasms of the usual shapes were observed, *e.g.*, globular, ovoid, trefoil, etc., and these forms were very variable. In very acute cases B. discovered groups, much larger than the usual forms, occupying a great part of the red blood corpuscles, and composed of 18–20 merozoites, either club-shaped or ovoid, radiating from a central point in the form of a rosette or mulberry, and in which the nucleus and the cytoplasm were clearly distinguishable.

WEST, J. L., & STARR, L. E. (1940). **Further Observations on a Blood Protozoan Infection in Turkeys.**—*Vet. Med.* **35.** 649–653.

An outbreak of a protozoal infection in turkeys is described. Organisms morphologically identical with *Leucocytozoon smithii* were found in stained blood smears and their structure is compared with that observed in hanging-drop preparations. Although the mortality was only 2%, blood smears revealed infection in 75% of the young birds and in 90% of the breeding flock. The birds were heavily infested with lice which were suspected of acting as vectors; no developmental stages of the parasites were, however, detected in crush preparations. Infected birds, which had been given by the owner 5% flowers of sulphur in the mash in an attempt to control lice, showed no parasites in blood smears made at a later date. Untreated birds carried the protozoa in the blood for periods up to 18 months.

The disease may occur as (1) a peracute form in which apparently healthy birds die suddenly following convulsions, (2) a subacute form characterized by weakness, progressive emaciation, and some opacity of the eyes, (3) a chronic form accompanied by arthritis and marked turbidity of the humours of the eye.—M. L. B.

HINSHAW, W. R., & MCNEIL, E. (1940). **Infectious Catarrhal Enteritis of Turkeys. Transmission and Prevention.** pp. 2. San Fransisco, Calif.: Division of Veterinary Science, University of California. [4to] [Mimeographed].

The symptoms and pathology of this condition due to *Hexamita* infection have already been recorded [*V. B.* **9.** 760]. The older carrier birds are the main source of infection for poults, which may receive small sublethal doses of the organisms in increasing numbers until fatalities are caused. Suggestions for prevention and control of the disease are based on accurate diagnosis and general hygienic principles.—M. L. BINGHAM.

VAN DER WALLE, N. (1938). Leptospirose bij honden te Antiwerpen. [**Leptospirosis of Dogs in Antwerp**].—*Ann. Soc. belge Méd. trop.* **18.** 313–338. [French summary].

A longer version of a paper published elsewhere [*V. B.* **9.** 764].

STENIUS, P. I. (1940). Leptospirosis hos räv i Finland. [**Leptospirosis of Foxes in Finland**].—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 968–986. Discussion pp. 986–988. [In Swedish: German summary].

Leptospirosis was diagnosed for the first time on fox farms in Finland in 1937, since when it has been observed on ten farms. Only a few foxes have become infected; the disease does not spread readily between foxes, being spread usually by rats and/or rat urine. The course of illness may be acute or chronic, is accompanied by slight icterus, and is typically fatal.

A leptospira was seen in the kidneys of affected foxes and in the ileum of some cases. Attempts to identify the organism by culture and g. pig inoculation failed because of the presence of contaminants in the material sent for diagnosis, but from the symptoms it was probably *L. icterohaemorrhagiae.*

The disease is controllable by hygienic measures, including rat control.

In the discussion on the paper, NORDSTRÖM described leptospirosis on a large fox farm in Sweden, where serological tests revealed infection in 20 out of 320 animals (aggln. with *L. icterohaemorrhagiae* at a titre of 1 : 100). Five of these 20 foxes were excreting leptospira in their urine. It was found that rats were implicated in spreading the disease. N. states

that the disease does not spread easily between foxes because fox urine is acid and consequently leptospira present in it soon perish. For the same reason urine is bad material for cultural or animal inoculation diagnosis; kidney suspension should be used instead.
—J. E.

DUBOIS, A. (1940). Nouvelle espèce de spirochète parasite de la souris. **[A New Species of Spirochaete Parasitic in Mice].** —*Bull. Soc. Path. exot.* **33.** 9–12.

The existence is recorded of a spirochaete parasitic in the vesiculae seminales of male white mice, and in the mammary glands and vaginal glands of female mice. The organism is semi-rigid and exhibits only slow movement. Attempts to cultivate it on the ordinary spirochaetal media, or in chick embryos, were unsuccessful. The organism appears to be non-pathogenic, and it is suggested that it is transmitted by sexual intercourse. It is proposed to name this organism *Treponema vesiculae*.—U. F. RICHARDSON.

MANOUÉLIAN, Y. (1939). Structure de la langue chez les mammifères, tropisme de certains virus et mécanisme de l'infection de la salive. **[Structure of the Tongue in Mammals; Tropism of Certain Infective Agents in Connexion with Infection of Saliva].**—*C. R. Soc. Biol. Paris.* **131.** 1012–1015.

One form of rat-bite fever in man is due to infection with *Spirillum minus*. This organism causes a mild chronic disease in rats. At certain periods it can be found in rats in small numbers in the blood, lymph nodes, and the liver, but it has a special predilection for striped muscle fibres. The extreme thinness of the lingual epithelium is stressed, and it is claimed that in man and in other animals striped muscle fibres reach to within 100–200μ of the surface. In infected rats *S. minus* can be found in fairly large numbers in the muscles of the tongue, and it is claimed that infection of the rat's saliva occurs through small abrasions in the lingual epithelium. Man contracts the disease if bitten by a rat with infected saliva.—JOHN FRANCIS.

BENGTSON, I. (1941). **Immunological Relationships between the Rickettsiae of Australian and American "Q" Fever.** —*Publ. Hlth Rep., Wash.* **56.** 272–281. [Author's summary copied *verbatim*].

Agglutination and agglutinin absorption tests afford evidence of the identity of the rickettsiae which are the etiological agents of Australian "Q" fever, a disease affecting principally abattoir workers in that country, and a similar disease which occurred as the result of a probable laboratory infection in a member of the staff of the National Institute of Health. Further evidence of the identity of the two organisms has been shown in tests with immune and convalescent sera and Berkefeld N filtrates and ultrafiltrates, though this test was not shown to be that of a true precipitin reaction.

MURGATROYD, F. (1940). **A Review of Immunization against Human Rickettsial Diseases.**—*Trans. R. Soc. trop. Med. Hyg.* **34.** 1–32. [Discussion pp. 33–36].

The main features of the rickettsial diseases are reviewed with special reference to active immunity. It is pointed out that, in practice, difficulties are encountered because living vaccines, including attenuated strains, may be dangerous, while dead rickettsiae have relatively little immunizing power. It is considered that the virus of the benign murine type of disease is not completely inoffensive, and may occasionally induce reactions which are far from negligible.

Vaccines prepared from various rickettsiae grown in tissue culture, in developing eggs, or in the lungs of mice, are giving promising results.

In the discussion, FINDLAY pointed out that the egg-yolk vaccine of NICOLLE and LAIGRET has been given to about two million natives in Tunis without producing severe reactions. He felt, however, that the experiments had not been sufficiently well controlled, and that the beneficial results might have been attributable partly to a natural immunity in a considerable proportion of natives, and partly to the concurrent introduction of hygienic precautions, such as de-lousing campaigns. The use of the vaccine in Europeans has been prohibited since the reactions are sometimes very severe.

FINDLAY thought that the mouse-lung method was promising. When the Swiss strain of mouse was used, the animals died in 48 hours with a hypothermia. The rickettsiae, which were very abundant in the pulmonary tissues, were recovered by differential centrifugation. Mouse-lung vaccine produced no appreciable reaction in man and retained its immunizing properties for at least six months.
—R. E. GLOVER.

WENRICH, D. H. (1941). **The Morphology of some Protozoan Parasites in Relation to**

Microtechnique.—*J. Parasit.* **27.** 1–28.

When individuals of a single species are treated by identical methods of fixation and staining, similar results are not always produced, owing to the variation between individuals and differences in their environments. Also, different species, because of specific differences, frequently show different results with the same technique. W., who has studied over a number of years the relation between protozoan morphology and microtechnique, has included some valuable observations in this contribution. He considers that specimens are often exposed to the fixative for too long a period and that shorter exposures produce better results. Fixatives can be greatly diluted with advantage without their effectiveness being lost. Mercuric chloride, acetic acid, and alcohols are more efficient in weaker solutions. Schaudinn's fluid and its dilutions appear to be the most efficient and adequate fixatives tested. One-quarter strength satisfactorily fixed *Endolimax*, *Iodamoeba*, and *Entamoeba histolytica*. One-half strength Bouin's fluid was as efficient as normal strength when tested on *E. histolytica* and *Endolimax nana*. Bouin's is satisfactory for *Dientamoeba* but its penetration of cysts is not good. Careful microtechnique gives evidences of chemical differences and these, occurring between and among the different genera, are valuable confirmation of the validity of the groupings which have been established by taxonomy.—C. Horton Smith.

Adler, S., & Foner, A. (1941). **Culture of Intestinal Protozoa.**—*Lancet.* **240.** 243–244.

Successful cultivation of various human intestinal protozoa was obtained in a semi-solid medium, consisting of 1 part 3% agar, 8 parts Locke's solution (containing 0·1% glucose), 1 part inactivated serum (horse, cow, goat, or human), and with rice-starch added as in Dobell and Laidlaw's medium. Even better results were obtained if the medium was inoculated with a culture of *Bacterium prodigiosum* a day or two before introduction of the protozoa. The protozoa grew throughout the medium, instead of being confined to the bottom of the tube as in liquid media. With repeated subcultures the intestinal flora introduced with the original inoculum became considerably modified, and rich cultures could be used for animal inoculation experiments without fear of peritonitis or sepsis.

The medium with *Bact. prodigiosum* was used successfully for *Entamoeba histolytica* and *Trichomonas intestinalis*, giving rich cultures in 48 and 24 hours and surviving for 17 and 15 days respectively.

Coverslip preparations of *Balantidium coli* cultivated in this medium with the addition of 1 : 5,000 Takadiastase showed up to 250 protozoa per preparation, and in the medium plus *Bact. prodigiosum* up to 450 per preparation. Both types of culture survived for 28 days.—E. S.

DISEASES CAUSED BY VIRUSES

Jerlov, S. (1940). Mul- och klövsjukeepizootin i Sverige 1938–1940. **[The Foot and Mouth Disease Outbreak in Sweden, 1938–40]**. pp. 156. Stockholm : Statens Reproduktionsanstalt. [8vo].

This report contains 11 chapters on the outbreak, four articles on special research work carried out during its course, two appendixes on special government decrees etc. and on co-operation with Denmark respectively, and certain diagrams, maps, and tables. The chapters are as follows :–

(1) Historical.—A short account of previous outbreaks of the disease in Sweden is followed by an outline of the spread of the 1938–40 European epizootic in France, Belgium, Holland, Germany, Switzerland, Czechoslovakia, Hungary, England, and Denmark. The course of the outbreak in Sweden is then described in detail, county by county.

(2) The Disease in Sweden.—The first case was diagnosed on May 15th, 1938 at Borrby, one mile inland from the south-eastern extremity of the country, in Kristianstad county. Infection had evidently been introduced by means of a fishing boat which had come from Germany. This primary outbreak was stamped out and no further case occurred in this county until October, when the disease invaded it from Malmöhus, which was the most heavily infected county of all. In Malmöhus the first case occurred on August 27th, 1938 at Sövestad, and the source of infection could not be determined. On September 1st a very large herd at Klågerup became infected, whence the disease spread far and wide, largely owing to the congregation there of large numbers of people for a festival. Other primary outbreaks

occurred around Hälsingborg, the port nearest to Denmark. Outbreaks in the county of Göteborg and Bohus and the county of Halland along the south-west coast, north of Malmöhus, occurred towards the end of 1938 and appeared to have originated from Jutland, Denmark, infection being spread by means of fishermen. By the end of the year the disease extended over most of southern Sweden south of latitude 59°, except for a free zone down the east coast. After February the disease died down and by July 1939 was present only in Malmöhus, but after the early part of the year the continuation of the disease was mainly due to the presence of type A virus, the main outbreak having been due to type O virus. A small outbreak also occurred in Norrbotten, in the extreme north, infection coming in from Finland.

(3) Administrative Control Measures.—In February 1938 a F. & M. disease commission was created by the Medical Board. The commission prepared control plans and organized control work until November 14th, when the gravity of the situation demanded a full-time organization. The Medical Board founded a special section, at first under Frykholm and later (from November 22nd) under Jerlov, who remained in charge until July 15th, 1939, when the work was completed. The above commission continued to act in an advisory capacity: a list of problems which it handled is given.

(4) Control in the Field.—The stamping-out method was used in the beginning, but had to be abandoned when the outbreak got beyond control. It was carried out with the aid of various special workers, *viz*, valuers, burial men, watchmen, disinfectors, abattoir workers, transport men, and veterinary surgeons and students. Disinfection of farm buildings after the slaughter of infected herds was effected with 1% caustic soda with or without 5% lime solution and formalin. Formalin fumigation was also used. The cost of disinfection including that for killing and burial varied from 19 kr. per bovine to 41·60 kr. per bovine in the various counties. From November 17th, control by isolation and the prohibition of movement to and from infected farms by persons was carried out. The cost of disinfection under control by isolation was only about 4 kr. per bovine. The total cost of disinfection during the whole outbreak was estimated at about 1 million kr.

The slaughter of affected herds was done with rapidity, with a few exceptions within 36 hours of issue of the order. A large proportion of the condemned cattle, sheep, and swine was transported to abattoirs for slaughter and the meat was thereby saved for use and about 25% of the compensation cost to the State was thus recovered.

During the period of control by isolation, restrictions included the prohibition of movement of infected farm personnel, prohibition of communal gatherings for pleasure purposes (festivals, dances, etc.), but not for religious purposes, and the isolation of as yet uninfected farms visited by dairy milk collection vehicles which had called at infected farms. The above personal restrictions became too irksome after a time and eventually ceased to have the desired effect, as people found ways to circumvent them. Luckily this occurred during retrogression of the outbreak.

There was a great shortage of veterinarians, even after retired men and students had been called in. Eighty-three veterinarians took part for an aggregate of 4,003 days.

(5) Deaths and Other Losses through F. & M. Disease in Sweden.—Details are given in tables. Of 100,845 cattle in infected herds, 2,137 (including 1,210 calves) died from the primary effects and 3,326 had to be killed owing to after-effects. Of 97,152 pigs in infected farms, 7,726 (including 6,421 sucklings) died and 870 had to be killed. Total percentage losses of cattle and swine were thus 5·42 and 8·85.

Important sequels in cattle were mastitis (commonly due to *Corynebacterium pyogenes* infection), loss of hooves, abscesses in the muscles, arthritis, myocarditis, and septicaemia. In sows the disease often resulted in abortion, and new-born piglets failed to survive. The financial loss to farmers was estimated at 3,000,000 kr. for loss of animals, 1,600,000 kr. for loss of milk, and 1,100,000 kr. for waste of milk. It is estimated that the total direct and indirect loss from the outbreak was 22 million kr. in Sweden, 175 million kr. in Denmark, 120 million kr. in Belgium, 130 million kr. in Holland, and 480 million RM. in Germany.

(6) Geographical Spread and Routes of Infection. — Particulars, complementary to these in chapter 2 are given [a large-scale map would be necessary for an appreciation of the details], and the question of transmitting agents is discussed with special reference to man, farm animals, birds, water, wind, and foodstuffs. Many instances are quoted to show the importance of persons in spreading infection. It

appears that the disease was brought into Sweden exclusively by this means. Birds are not considered to play a significant role, neither is wind. One case each of transmission by water and foodstuffs is quoted.

(7) Dairy Regulations.—When loaded dairy vehicles arrived at the dairies, the vehicle and the milk cans had to be disinfected with 0·25% caustic soda, the driver was forbidden to enter the dairy buildings, and the dairy reception personnel had to wear rubber boots and to disinfect them. It was necessary to have a special inspector at each dairy to see that this was done. The regulations were effective, as no outbreaks referable to dairy products were traced.

(8) Vaccination.—Some small-scale tests were carried out from February 1939 and mass vaccinations were made between April and September, all with Danish adsorbate vaccine. (i) A large herd near Malmö was vaccinated with a type O vaccine: it escaped infection whilst other herds nearby became infected. (ii) Fourteen vaccinated cattle were bought from two other vaccinated herds and were sent to some newly infected herds. Only three of them contracted the disease. (iii) 2,944 cattle in 147 herds were vaccinated with bivalent A and O vaccine. The result seemed favourable, but the disease was dying out at the time. Only five of the herds became infected and only a few animals in them. These outbreaks were all due to type O virus. Whether the vaccine was infective in these cases could not be determined. (iv) Mass vaccination was carried out in 96,801 cattle in 16,425 uninfected herds in the infected area of Skåne province, by two doses of vaccine given at 14 days' interval. The vaccine was sent from Denmark, and collected and distributed at a special laboratory at Malmö. Only 32 vaccinated herds became infected, 18 of them within 14 days of the completion of vaccination. Judging from two cases of infection which occurred over one month after vaccination, immunity had begun to wane after 4½ months. (v) Riems vaccine was used in another area for ring inoculations, in which 1,700 cattle in 159 herds were immunized with good effect. J. concludes that the vaccinations had a certain amount of protective power against the disease.

(9) Control Measures for Travellers across the Öresund.—As the epizootic spread beyond control in Denmark and after it had begun to appear in Sweden, it became evident that human traffic from Denmark to Sweden across the channel between Själland and Malmöhus county was the chief means of transmitting infection eastwards over the water. Boat passengers to Malmö, Landskrona, and Hälsingborg were at first asked to clean and disinfect their outer garments, and later were compelled to do so (from November 14th to December 6th). This was stopped when it was seen that new infection from Denmark no longer mattered, as infection had already become established in Sweden and was indeed getting beyond control. J. points out the importance of the passenger traffic and states that Sweden cannot be held free from F. & M. disease when it has appeared in Själland unless this traffic is rigorously controlled. Attempts to do so would cause a great public outcry which could only be overcome if the prohibition order were to come from the Crown. In the present case the local authority was concerned. The monthly arrivals at the named Swedish ports normally approximate 35–50 thousand persons travelling on business and pleasure. To succeed, control over persons must be applied early and in conjunction with the stamping-out policy.

(10) Occurrence of Chronic Virus Carriers.—The matter is discussed, instances from earlier outbreaks are mentioned and particulars given of 38 cases in this latest Swedish outbreak in which virus carriers had been incriminated in causing secondary cases, *viz*, 24 cases in which a surviving bovine from one outbreak was taken to an uninfected herd and introduced the disease therein at intervals from 51–328 days after the primary infection, and 14 cases in which previously uninfected bovines were taken into a herd which had passed through an outbreak; the disease appeared in the new stock at intervals from 44–363 days after the primary infection. Most of the secondary outbreaks occurred between the fourth and fifth month of the primary outbreak.

(11) Work of the State Provisional Serum Laboratory, Malmö.—This special laboratory was created to undertake typing of virus, trials of disinfectants, and the production of convalescent plasma. Of the latter 23,000 litres were produced and most of it was sold to cattle owners. It proved to be valuable in lessening the severity of the disease in newly infected animals.

Here follow reports of four research projects:–

(A) Statement on an Experiment on Simple Disinfection [Jerlov, S.].—In order

to check whether infected farms could be cleansed of infection, after an outbreak and slaughter of all the animals, simply by cleansing byres and their approaches [precise details are not given, but in one case mention is made of " Sodalut ", presumably washing soda, added to the water], five farms were disinfected with 1 % caustic soda and four were merely cleansed. A secondary outbreak appeared in newly introduced cattle at two of the cleansed farms, but none occurred at the disinfected farms.

(B) Experiments on the Risk of Infection from Infected Animals, Sacks, Cattle Cakes etc. [Jeppsson, Hj.].—J. carried out nine tests with food concentrate which came from infected farms, by feeding it to susceptible cattle. Only in two tests, in which the food had been directly infected by the placing on it of vesicle fluid, did the disease appear in the test animals. In no case did food or sacks left on infected premises become infected. Sacks infected by saliva, hung in the open air for four days, then stored indoors for ten days, were not infective.

(C) Vaccination Experiment [Jeppsson, Hj.].—Brief notes are given on several bovines which were sent to newly infected herds 14–22 days after being vaccinated [presumably with Danish type O vaccine]. Most of them resisted infection.

(D) Experiments to Determine the Extent to which Human Beings can act as Active Carriers of F. & M. Disease Virus [Huss, R.]. —A search was made for virus in the faeces of farm workers who had drunk raw milk from clinically infected cows. It was only found in one of 47 samples. The blood serum of three out of five persons who were clinically affected with F. & M. disease was found to contain antibodies, but that of 18 healthy persons on affected farms contained no antibodies (according to the technique used; the amount of serum, 3 c.c., was small).

Tables at the end of the report give information on the number of herds to which control by isolation and slaughter was applied in the affected counties of Sweden, numbers of infected herds in the separate months of 1938 and 1939 in Sweden, Denmark, Norway, Finland, England, Holland, Germany, Belgium, France, and Switzerland, numbers of cattle and swine on infected farms in Sweden during the outbreak, numbers of slaughtered cattle, sheep, and swine, amounts of compensation money paid, and cost of all the control work (classified). Some graphs and six maps are also included. —J. E.

Flückiger, G. (1940). Lehren aus dem Maul- und Klauenseuchezug 1937/39. **[Lessons from the Foot and Mouth Disease Outbreak of 1937-39].**—*Schweiz. Arch. Tierheilk.* **82.** 93–112.

A general review containing no new information.—J. B. Brooksby.

—. (1939). Suisse. Rapports sur la prophylaxie de la fièvre aphteuse. **[Switzerland: Reports on the Prophylaxis of Foot and Mouth Disease].**—*Bull. Off. internat. Epiz.* **19.** 461–481.

The reports of two commissions formed to investigate various questions concerning F. & M. disease are given. The report of the first commission summarizes the correspondence between the Federal Veterinary Office and Dr. Graub, regarding facilities for field trials of G.'s crystal-violet vaccine [see *V. B.* **11.** 161].

The reports of the second commission deal with the evidence available regarding the efficacy of the Riems vaccine and of various vaccines of Swiss origin. The Riems vaccine was considered the most efficient and it was recommended that efforts should be made to obtain it from Germany or other countries; otherwise consideration would have to be given to the erection of a special plant for its production in Switzerland.—H. H. Skinner.

Ježić, J., Katalinić, H., & Ručević, M. (1940). Izvješ:aj o prvim pokusima adsorbatvakcinom protiv slinavke i šapa u Jugoslaviji. **[Report on the Use of Foot and Mouth Disease Adsorbate Vaccine in Yugoslavia].**—*Jugoslov. vet. Glasn.* **20.** 1–16. [Abst. from French summary].

The authors have found by tests on 20,000 cattle that adsorbate vaccine [made presumably by the Riems method] is innocuous, and that it confers immunity against natural infection which lasts for many months. This immunity is firmly established 14 days after vaccination. A plea is made for the establishment of a vaccine-producing institute in Yugoslavia.

I. Moussu. (1939). Immunité antiaphteuse avec virus actif par MM. les Drs. Sordelli et Robert Lignières de Buenos-Ayres. **[Immunization against Foot and Mouth Disease with Sordelli and Lignières' Live Vaccine].**—*C. R. Acad. Agric. Fr.* **25.** 106–108.

II. Sordelli, & Lignières, R. (1939). Virus aphteux adsorbé sur alumine et immunité antiaphteuse. **[Immunization**

against Foot and Mouth Disease with Virus Adsorbed on Alumina].—*Ibid.* **25.** 109–113.

I. An introduction to II.

II. The authors claimed to have obtained good results in experimental immunization with this vaccine, but stated that more work would have to be done before it could be used in the field. [The method of manufacture of the vaccine has not been divulged.]

NYFFENEGGER, A. (1940). Schutzimpfungsversuche gegen Maul- u. Klauenseuche mit Pockenvaccine. [**Immunization against Foot and Mouth Disease with Pox Vaccine**].—*Schweiz. Arch. Tierheilk.* **82.** 187–204. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 359].

During the last outbreak of F. & M. disease in Switzerland, N. vaccinated over 1,000 cattle with pox lymph; the reactions are described. It appeared that pox infection developed unusually slowly in animals which had passed through F. & M. disease, and that pox-vaccinated cattle showed some resistance to F. & M. disease, in particular to complications which are apt to follow this disease.—J. E.

CORDIER, G. (1940). Adsorption du virus aphteux par le charbon d'os. Application à l'immunisation "II" chez le mouton. [**Adsorption of Foot and Mouth Disease Virus by Bone Charcoal. Immunization Trials in Sheep**].—*Rec. Méd. vét.* **116.** 69–74.

Earlier work carried out on g. pigs [*V. B.* **10.** 924.] was repeated in sheep, virus adsorbed on to a 10% suspension of animal charcoal being inoculated subcutaneously or intravenously in single or double doses of 1–2 c.c.

Infection was occasionally produced by this unattenuated adsorbed virus, and further work was done using a preliminary dose treated with formalin.—H. H. SKINNER.

KLEINE, F. K. (1939). Wild und Maul- und Klauenseuche. [**Wild Game and Foot and Mouth Disease**].—*Dtsch. tierärztl. Wschr.* **47.** 604–605.

In view of the contentions of WALDMANN and HIRSCHFELDER and of STROH [*V. B.* **9.** 703.] that wild animals play no prominent part in the spread of F. & M. disease in Europe, K. draws attention to some observations made in Southern Rhodesia. As reported by LAWRENCE [*V. B.* **9.** 280.] the kudu antelope has been proved susceptible to natural infection with F. & M. disease and the eland antelope is probably also susceptible. The part played by such infected wild game in maintaining the disease in Southern Rhodesia in 1934–36 may have been an important one. K. upholds Lawrence's belief that passage of the virus through wild game may cause it to change its type.—H. H. SKINNER.

GIRARDON, C. (1939). Accertamenti sulla diffusione della pleuro polmonite essudativa bovina (Sambab o Berfur o Agmar) nel territorio della Somalia italiana—provvedimenti profilattici proposti. [**Bovine Contagious Pleuro-Pneumonia in Italian Somaliland**].—*Azione vet.* **8.** 361–363.

Bovine contagious pleuro-pneumonia is stated to be widespread in Italian Somaliland. In the Sambab area it is said to have caused the loss of more than half the cattle. Recommendations are made for control of the movements of cattle, isolation of affected herds, and vaccination of in-contact animals with pleural exudate.

—U. F. RICHARDSON.

LE ROUX, G. (1940). La valeur immunigène des ganglions hématiques des veaux atteints de peste bovine expérimentale. [**Immunizing Power of the Haemo-Lymph Nodes of Calves Experimentally Infected with Rinderpest**].—*Bull. Soc. Path. exot.* **33.** 235–238.

The author, in three series of observations, compared directly the activity of vaccines prepared from lymph nodes and from haemo-lymph nodes. Equal weights of these tissues were removed from a number of calves experimentally infected with rinderpest and slaughtered on the 5th day. The vaccines consisted of 1 : 4 emulsions of the tissues in toluene. They were used from 7–10 days after preparation, and the test inoculations were made a fortnight later. Vaccines were injected in graded doses of 0·5–8·0 c.c. and the reactions to the subsequent test inoculations were noted.

The haemo-lymph nodes in experimentally infected calves had a distinct immunizing power practically equal to that of the lymph nodes. It was only in the smallest doses that there was any noticeable difference in efficiency between the two vaccines.—H. E. HARBOUR.

GLÄSSER. (1940). Zum gegenwärtigen Stande, zur Diagnose und Differentialdiagnose der Schweinepest nebst Berichtigungen zu einem Artikel von Radtke über Ferkelgrippe und Paratyphus des Schweines (BTW. 1937 Nr. 8). [**The**

Present Situation in Regard to Swine Fever, its Diagnosis and Differential Diagnosis, with Comments on a Paper on Piglet Influenza and Swine Paratyphoid by Radtke (1937). *Berl. Münch. tierärztl. Wschr.* **Feb. 19th. 113–116**].—*Berl. Münch. tierärztl. Wschr.* Jan. 5th. 4–8.

In the year 1913 the incidence of S.F. in Germany reached a peak with some 25,000 outbreaks affecting nearly 200,000 swine. Since then it had varied from year to year with certain high points but gradually fallen, and for some years previous to 1938 it stood at about 500 outbreaks per year. A sudden rise then took place and during the first three-quarters of 1939 there were about 3,000 outbreaks.

The new epidemic broke out in two districts and soon spread to a large area in north-west Germany, an area which had been almost entirely free for some years. G. believes, however, that a new strain of virus may have been imported from south-eastern Europe, and that two circumstances contributed to the seriousness of the outbreak :– firstly this importation of a new strain into an area of dense swine population and traffic, and secondly the fact that the disease ran a somewhat chronic course, deaths frequently not occurring until the second or third week although mortality was high.

A detailed account of the special clinical and P.M. features of the outbreak is given, stress being laid on the fact that whilst the recognized " haemorrhagic " type of lesion was present it was much less marked than in previous outbreaks, intestinal symptoms of a catarrhal nature with diarrhoea, then constipation, and marked respiratory symptoms and lesions being common and associated with a chronic course and great weakness.

Emphasis is laid on the necessity for veterinary surgeons and owners to recognize the early symptoms and so to avoid spread. Diagnosis could usually be made by examining several pigs and noting the character and widespread nature of the lesions as a whole. Differential diagnosis is dealt with at some length with particular reference to :– (1) a form of eczema associated with marked loss of condition and some lung symptoms, but no lesions in intestines, urinary tract, or lymph nodes; (2) swine pox; (3) swine erysipelas, stress being laid on the rapid course of this disease, general reddening of the skin, swelling of the spleen, intestinal catarrh, absence of all other S.F. symptoms or lesions and finding of *Erysipelothrix rhusiopathiae*, and (4) paratyphoid or the so-called *Ferkeltyphus*, emphasis being laid on limitation of this disease to weaners, the chronically ulcerated large bowel with lesions arising mostly around the lymph follicles, and the characteristic pan-like ulcers with walled edges and " eaten away, dry, cheesy base ", and the peculiar greyish yellow and swollen intestinal lymph nodes.

The article concludes with a discussion on an article by RADTKE [*V. B.* **8.** 38.] on the diagnosis of swine influenza (*Ferkelgrippe*) and paratyphoid, in which the existence is doubted of a specific disease caused by *Salmonella suipestifer*. G. concludes from a brief review of his own work and that of others that *Ferkeltyphus* is a specific disease marked by characteristic lesions and existent in Germany, that its enzootic character is not due to any lung infection, *e.g.* swine influenza, that it is essentially a sty endemic of young pigs and though sometimes a sequel to S.F. infection, can be distinguished without difficulty.

—A. W. STABLEFORTH.

I. LUGOMER, V. (1940). Da li aluminijev hidroksid adsorbira virus svinjske kuge ? [**An Attempt to Adsorb Swine Fever Virus**].—*Jugoslov. vet. Glasn.* **20.** 147–154. [Abst. from German summary].

II. LUGOMER, V. (1940). Pokušaj proizvodnje aluminiuma-hydroksid adsorvat vakcine protiv svinjske kuge. [**Experiments in the Preparation of a Swine Fever Adsorbate Vaccine**].—*Ibid.* 367–373. [Abst. from German summary].

I. In an attempt to adsorb S.F. virus on to aluminium hydroxide, L. succeeded in adsorbing all of the virus present in a 5% suspension, but not all in a 10% suspension.

No difference in results occurred whether the operation took place at room or at incubator temperature, nor did changes in pH influence the result.

II. Attempts to prepare a vaccine against S.F. similar to the Riems foot-and-mouth disease vaccine were unsuccessful. Formalinized adsorbate vaccine was dead and inactive, whilst this vaccine without formalin was virulent. It was not possible to attenuate adsorbed virus by preserving it for a long time at high or low temperatures, nor by altering the pH. Dried adsorbate virus seemed to be of some value, but the method was not improved enough for field use. The addition of oil or

saponin was also without helpful effect.

I. Oppermann, T. (1939). Ein Beitrag zur Differentialdiagnose der ansteckenden Blutarmut der Einhufer. [**Differential Diagnosis of Equine Infectious Anaemia**].—*Dtsch. tierärztl. Wschr.* **47.** 418.

II. Wittfogel, H. (1939). Die Leberpunktion im Dienst der Erkennung der ansteckenden Blutarmut der Einhufer. [**Diagnosis of Equine Infectious Anaemia by Liver Puncture**].—*Berl. Münch. tierärztl. Wschr.* April 28th. 261–263.

III. Nemec, W. (1939). Untersuchungen über das Vorkommen der infektiösen Anämie in der Ostmark mit einem vergleichenden histologischen Beitrag zur Diagnose. [**The Incidence of Equine Infectious Anaemia in Austria with a Comparative Histological Contribution to its Diagnosis**].—*Ibid.* Nov. 24th. 689–693, and Dec. 1st. 701–703.

IV. Röhrer, H., & Quabeck, L. (1939). Untersuchungen über das Vorkommen histopathologischer Veränderungen der ansteckenden Blutarmut in der Leber von Schlachtpferden aus den anämiefreien Regierungsbezirken Köln und Aachen. [**Histologic Liver Changes of Equine Infectious Anaemia found in Horses from the Anaemia-Free Districts of Cologne and Aachen**].—*Z. InfektKr. Haustiere.* **55.** 90–104.

V. Pallaske, G. (1940). Untersuchungen über das Vorkommen von Veränderungen der ansteckenden Blutarmut an Organen von Schlachtpferden der Grenz- und Neumark. [**Lesions of Equine Infectious Anaemia in the Organs of Horses Slaughtered in Grenzmark and Neumark**].—*Ibid.* **56.** 25–43.

I. The difficulty in diagnosis of E.I.A. is illustrated by a case in a seven-year-old draught mare which showed a blood picture of anaemia and gave a positive reaction to the sublimate test for E.I.A. There was a marked leucocytosis which, in view of the very poor condition of the animal, suggested TB.; the tuberculin test, however, was negative. The animal was treated for intestinal parasites as strongyle and *Ascaris* eggs were present in large numbers in the faeces, but there was no improvement in condition. At autopsy it appeared probable that a heavy infestation with *Gastrophilus* larvae may have accounted in part for the leucocytosis and the anaemia, but histological examination confirmed the presence of E.I.A.

The importance of histological examination is stressed as a means of differential diagnosis in the control of the disease. On the farm in question, there were two foals with anaemia and, in the absence of restrictions as to sale of animals from the farm, it was probable that they would be disposed of and thus spread the disease. All cases of anaemia in horses should be examined by histological methods (material obtained by liver puncture).

II. Liver puncture with a trocar has been used for the diagnosis during life of E.I.A., but the operation is sometimes complicated by injury to the intestine and in other cases is difficult because of the abnormal position of the right lobe of the liver (atrophy of the liver or an unusually convex diaphragm, especially in multiparous mares). W. has tried insertion of the trocar just in front of the 13th rib, on a line level with the hip joint, the usual site being in front of the 15th rib. This modification results in penetration of the liver from its anterior surface, the trocar first penetrating the diaphragm and a small thickness of lung. The method is claimed to be more successful, particularly in old animals in which there may be atrophy of the right lobe.

In acute cases of E.I.A. the examination of biopsy material agreed with the clinical findings and subsequent autopsy (17 cases); the method failed, however, to detect two of 13 chronic cases. Liver puncture is not considered suitable for general use by the practitioner in the control of the disease, but should at present be restricted to the specialist.

III. This paper gives a detailed account of a careful histological examination of various organs and tissues for the presence of E.I.A. The animals were divided into three groups :– Group 1.—Seven horses dying from E.I.A. or slaughtered because of the disease. This material had been collected at various times since 1932 and showed the histological changes generally accepted as characteristic. Group 2.—Five horses used for serum production. The above histological changes were for the most part absent, in particular the haemosiderosis of the liver and absence of pigment in the spleen, the two most characteristic features in E.I.A. Group 3.—86 horses from various districts in Austria, coming to emergency slaughter. In three animals there was definite histological evidence of E.I.A., and a further 17 cases were considered suspicious. It is thus probable that the disease is much more widely distributed

throughout the country than was formerly believed.

IV. This paper deals with the histological examination of material from 150 apparently healthy horses slaughtered at Cologne abattoir. The animals were classified in three groups as follows :– Group 1.—In 97 animals there were no changes suggestive of E.I.A. Group 2.—Small amounts of haemosiderin were found in the Kupffer cells in 23 animals. Group 3.—Marked proliferation and haemosiderosis of the Kupffer cells were present in 29 cases. In one animal there was proliferation and haemosiderosis of the reticulo-endothelial cells in the liver, together with a marked deficiency of blood pigment in the spleen. This was the only case which might have been affected with E.I.A. Haemosiderosis of the Kupffer cells was not merely a phenomenon found in old age, being present in several animals under ten years old.

These results indicate that the finding of haemosiderosis of the liver should not of necessity be taken as indicating the presence of E.I.A.

V. Material was examined histologically from 241 horses slaughtered at the abattoirs of Landsberg, Königsberg, Küstrein, and Schneidemühl, as well as from a further 31 animals in the course of bacteriological work for the purpose of meat inspection. Approximately 5% of the animals showed histological changes indicating E.I.A. The criterion of E.I.A. was marked haemosiderosis of the Kupffer cells and it is admitted that a proportion of such cases may possibly not have been associated with E.I.A. Nevertheless, the importance of a routine study of material from knackeries is stressed as an additional method in the State control of the disease. P. has recommended that the Minister of the Interior should introduce legislation making it obligatory to send material from all horses slaughtered to a pathological laboratory for examination when there is no clear evidence at autopsy of the cause of the symptoms observed during life. In the case of a positive report from the laboratory the premises from which the animal came should be visited by a government inspector and a study of the epidemiological evidence made. In addition, the owner will be obliged to notify the inspector of his intention to sell or slaughter any horse on the premises.
—E. G. White.

Seifried, O., & Krembs, J. (1940). Die Veränderungen des Zentralnervensystems bei der infektiösen Anämie der Pferde. **[Changes in the Central Nervous System in Equine Infectious Anaemia].** —*Z. InfektKr. Haustiere.* **56.** 157–173.

The authors have confirmed the findings of previous workers who recorded a non-purulent encephalomyelitis, associated with degenerative changes in nerve cells and neuroglia, in a proportion of cases of E.I.A. Degenerative and proliferative changes were found in relation to the blood vessels and in chronic cases there was an ependymitis.

These lesions are not constant and are of no greater use for diagnosis than are the somewhat similar changes which may be produced in pigs by swine fever virus.—E. G. White.

Trautwein, K., & Schmidt, W. (1940). Ansteckende Blutarmut bei Fohlen. **[Equine Infectious Anaemia in Foals].** —*Z. InfektKr. Haustiere.* **56.** 175–189.

This is a detailed account of E.I.A. in foals of varying ages, the disease running an acute, subacute, or chronic course and resembling in all respects the infection as seen in adult animals. Under grazing conditions the disease spread very rapidly.

Five cases were encountered among ten foals from infected mares, the ages of the foals varying from ten days to nine weeks. Of 25 foetuses, 175–336 days old, from affected mares, ten showed lesions which indicated the presence of E.I.A. It is probable that intra-uterine infection is of considerable importance in the infection of foals.—E. G. White.

I. Shahan, M. S., Giltner, L. T., & Schoening, H. W. (1939). **A Review of the 1938 Outbreak of Infectious Equine Encephalomyelitis in the United States.**—*Proc. 42nd ann. Meet. U.S. Live Stk sanit. Ass., 1938.* pp. 145–157.

II. Riordan, C. F. (1939). **Massachusetts Experiences an Invasion of Equine Encephalomyelitis, Eastern Type.**—*Ibid.* pp. 157–161.

I. In 1938 the disease occurred in 39 states with 79,606 cases and about 21% mortality [see also *V. B.* **9.** 847, and **10.** 758]. Virus has been recovered from 27 states, Eastern virus from nine states on the Atlantic seaboard and only Western virus from states west of the Appalachians, but in six states the type has not been identified. Other places in which outbreaks of the disease have occurred in recent years are Canada, Argentina, Brazil, Chile, Panama, Peru, Venezuela, Russia, Japan, and

India. In the U.S.A. the virus of E.E. has been found to be immunologically or serologically distinct from those of vesicular stomatitis, St. Louis human encephalitis, herpes, Japanese types A and B encephalitis, poliomyelitis, louping ill, blue tongue, fox encephalitis, vesicular exanthema, and equine infectious anaemia.

Human infection due to the Eastern type of E.E. was identified in 1938 in Massachusetts [*V. B.* **9.** 240.], and due to the Western type in California. The following have been found susceptible in addition to the horse :– (a) to the Western type of E.E. virus—man, g. pig, rat, mouse, rabbit, monkey, pigeon, calf, dog, goat, duck, hen, greylag goose, hawk, turkey, and guinea fowl ; (b) to the Eastern type of E.E. virus—man, sheep, pig, European hedgehog, ring-necked pheasant, quail, and wild pigeon.

Suspected vectors are blood-sucking insects ; transmission has been effected by mosquitoes and also by the tick, *Dermacentor andersoni*, but in no case has the virus been recovered from any of the suspected insects [but see KITSELMAN & GRUNDMANN, p. 520]. Use of chick-embryo tissue vaccine has proved a distinct potential advance in the practical control of the disease.

II. This reports the observations made in 1938 in the first recorded outbreaks of E.E. in Massachusetts. The majority of the cases were confined to the small counties of Bristol and Plymouth where the terrain is drained by the Taunton river. Owing to heavy rains and the hot weather in July there were myriads of mosquitoes. There were 4,040 horses in these counties and as far as could be ascertained the deaths from E.E. numbered 164 [see also *V. B.* **9.** 847]. In the rest of the state there were 103 deaths from E.E. making a total of 267 among the 28,000 horses in the state. It is probable that 16,000 horses were given prophylactic vaccine treatment. The type of virus was identified as Eastern, and it is recorded that 98% of the reported cases were fatal. A point of interest is that no cases occurred in a notoriously tick-infested area. In the majority of cases, death occurred within 24 hours of the appearance of symptoms.—J. A. GRIFFITHS.

I. MORGAN, I. M. (1939). **Relation of Age to Immune Response of Mice to Formolized Equine Encephalomyelitis Virus.**—*Proc. Soc. exp. Biol., N.Y.* **42.** 501–503.

II. MORGAN, I. M. (1940). **Influence of Age on Rate of Immune Response of Mice to Formolized Equine Encephalomyelitis Virus.**—*Ibid.* **44.** 473–475.

I. Working with mice aged, at the beginning of the experiment, 2, 10, 15 and 30 days and 6 months, M. demonstrated that, within the age limits at which the tests were made, the immunity developed was progressively greater as the age increased at which immunization was done. The mice were all given 2 c.c. of a 10% suspension of formolized infected brain tissue on the first, third, and fifth days ; on the 13th day the 2-day-old mice succumbed to intracerebral injection of active virus, the mice 10–15 days old resisted 10 M.L.D., the 30-day-old mice resisted 100,000 M.L.D., and the 6 - months - old resisted 10,000,000 M.L.D. The 2-day-old mice did, however, show resistance to 1,000 M.L.D. given intra-abdominally.

II. Continuing the experiments, M. investigated whether the increased response to immunization was due to different rates of development of immunity or to the maximum immune response of which the various ages were capable. Mice 4–5 days, 14–15 days, and 3 months old were injected with formolized virus on the first, third and fifth days ; those 3 months old reached their maximum immunity on the sixth day and maintained it for 2–4 weeks ; those 14–15 days old reached a maximum antibody content between the eighth and tenth days, while those 4–5 days old showed no antibody response until the 12th day and showed moderate antibody content on the 20th day. The low resistance of the mice 10–15 days old, reported in I, did not increase during the four weeks of the experiment, in spite of a high titre of the circulating antibodies.

BEARD, J. W., BEARD, D., & FINKELSTEIN, H. (1930). **Vaccination of Man against the Virus of Equine Encephalomyelitis (Eastern and Western Strains).**—*J. Immunol.* **38.** 117–136.

The authors obtained high antibody content in the blood of human beings after immunization against both the Eastern and Western type of E.E. virus ; general and local reactions to the vaccine were mild or absent altogether, and they consider vaccination desirable in persons exposed to infection in the laboratory or in the field.

OLITSKY, P. K., & MORGAN, Isabel M. (1939). **Protective Antibodies against Equine Encephalomyelitis Virus in the Serum of Laboratory Workers.**—*Proc. Soc. exp.*

Biol., N.Y. **41.** 212–215.

Protective antibodies were demonstrated in the blood of a laboratory worker who had been associated with work on the Eastern strain of E.E. for six years, but had never shown any symptoms of disease, and it is suggested that in adult human beings, as has already been demonstrated in mice and g. pigs [*V. B.* **9.** 310.], the virus may be prevented from invading the central nervous system by localized barriers developed with age. It is pointed out that in the epidemic of E.E. in human beings in Massachusetts, children were predominantly affected.

I. Syverton, J. T., & Berry, G. P. (1940). **Host Range of Equine Encephalomyelitis. Susceptibility of the North American Cottontail Rabbit, Jack Rabbit, Field Vole, Woodchuck and Opossum to Experimental Infection.**—*Amer. J. Hyg.* Sect. B. **32.** 19–23.

II. Davis, W. A. (1940). **A Study of Birds and Mosquitoes as Hosts for the Virus of Eastern Equine Encephalomyelitis.** —*Ibid.* Sect. C. **32.** 45–49.

I. The test animals were inoculated by various routes with infected g. pig brain tissue diluted with Locke's solution to a 10% suspension; both the Eastern and Western types of virus were used. Field voles were very susceptible, all the test animals dying within four days after intracutaneous, subcutaneous, or intracerebral inoculation; woodchucks inoculated intracerebrally with the Western type died after 3–7 days, but after intracutaneous, intranasal, or subcutaneous inoculation they recovered and were found to be solidly immune to the homologous virus; the cottontail rabbit was very resistant to intracerebral inoculation; western jack rabbits inoculated intracerebrally with the Western type showed an immunity after a subclinical infection; opossums inoculated intracerebrally with massive doses of both Eastern and Western types survived with clinical evidence of infection, and were apparently unaffected by a second dose of homologous virus.

These results indicate that the field vole and the woodchuck, being the most susceptible, may act as reservoir hosts for E.E., while the subclinical infections in the jack rabbit suggest that inapparent infections must be considered in the study of the epidemiology of the disease.

II. D. tested 16 species of mosquitoes native to Massachusetts for their ability to transmit the virus of Eastern type E.E.; Swiss mice, g. pigs, pigeons, and English sparrows were the chief experimental animals, but wild migratory birds including two mourning doves, five redwings, five cowbirds, and a grackle were also employed.

All the species of *Aëdes* mosquitoes tested were found to be capable of transmitting the disease in the laboratory, but their feeding habits, flight range, abundance, and seasonal variations must be taken into consideration when applying these results; no transmission of the virus was obtained with *Culex*, *Mansonia*, or *Anopheles*.

The experiments with the birds showed that they could all be infected with the virus, and that infected birds may serve as a source from which mosquitoes may become infected. On the other hand, however, the virus disappeared from the blood of all the birds after four days, and the blood later contained neutralizing antibodies; no virus was found in the brain, spleen, or other organs of birds which were killed after recovery from infection.

Kitselman, C. H., & Grundmann, A. W. (1940). **Equine Encephalomyelitis Virus Isolated from Naturally Infected *Triatoma sanguisuga* LeConte.**—*Tech. Bull. Kans. agric. Exp. Sta.* No. 50. pp. 15.

A neurotropic virus was isolated from *T. sanguisuga*, "assassin bugs", collected from a field in Kansas on which horses infected with E.E. had been pastured the previous year; by cross-immunity and infection tests in g. pigs this was proved to be the Western type of E.E. virus.

T. sanguisuga, a large, bloodsucking bug known to feed on horses, is common in Kansas and is also found in most other parts of the U.S.A. where E.E. occurs. This is the first recorded evidence of natural infection of a bloodsucking arthropod with E.E. virus, although mosquitoes have been experimentally infected.

Camargo, F. (1940). **The Bacteriological Diagnosis of Infectious Encephalomyelitis (= Derriengue) of Horses.**—*J. Amer. vet. med. Ass.* **97.** 48.

Inoculation of brain tissue, obtained from one case during an epizootic of infectious "equine encephalomyelitis" in Mexico, produced paralysis, salivation, and death in g. pigs. By serial passage the incubation period in g. pigs was reduced from 17 days to 8 days at the fourth passage, after which the virus remained

fixed. It is stated that the virus isolated from clinical cases of the equine disease behaved in the same way as the agent isolated from cattle affected with encephalitis (= *derriengue*) and it is, therefore, believed that the same virus is responsible for the disease in both cattle and horses. Pigeons inoculated with infectious material from horses did not develop symptoms, a fact which distinguishes *derriengue* from true E.E.—N. J. Scorgie.

*Tuncman, Z. M. (1938). Nouvelles recherches sur la maladie d'Aujeszky. A propos de trois nouveaux cas observés à Istanbul. **[Aujeszky's Disease. Three New Cases Observed in Istanbul]**.—*Bull. Soc. turque Méd.* **4.** 106–108. [Abst. from abst. in *Bull. Inst. Pasteur.* **38.** 232].

The author reports three cases of Aujeszky's disease in dogs from which he succeeded in isolating the virus. There was an incubation period of 5–10 days; the animals showed a tendency to bite and the symptoms were clinically indistinguishable from those of rabies; the urine was virulent. [Remlinger found the urine to be non-virulent.]

Laszlo, H. (1938). Boala lui Aujeszky ca epizootie a purceilor sugari. **[Aujeszky's Disease in Unweaned Pigs]**.—*Rev. Med. vet., Bucuresti.* **50.** 301–313.

L. states that in 1935 he showed experimentally that a disease which had developed in 45 out of 70 three-week-old, unweaned pigs in a Rumanian piggery (with a mortality of about 60%), and which was diagnosed by the veterinary surgeon in charge as epizootic chronic broncho-pneumonia, was in reality an outbreak of Aujeszky's disease. In 1937 he observed two further outbreaks of the disease; the first affected the whole of the litters (13 head) of two sows, and the second affected 29 out of 44 unweaned pigs in another establishment, in all cases at the ages of 2–6 weeks. A striking feature of the outbreaks was the complete absence of itching in any of the affected piglets, which appeared to be dejected and unwilling to move, and staggered about when forced to rise; loss of appetite, raised temperature (39·8° – 41°C.), vomiting, and convulsions occurred in some of the affected animals. The most characteristic symptom is stated to have been complete loss of voice. The disease did not spread from the piglets to their dams, and evidence is adduced that the progeny of sows which had been previously affected with the disease remained immune from infection. The possibility is suggested that the main source of infection is rats, among which the disease is widespread, and which may transmit it to the piglets by biting them.

Moss, J. M. (1940). **Protection against Rabies. I. The Effect of Frequency of Dosage of Vaccine upon Immunity.**—*J. Lab. clin. Med.* **25.** 702–706. [Author's conclusions copied *verbatim*].

1. Administration of multiple daily doses of rabies vaccine seems to retard immune response. 2. In our experiments an earlier response with a longer duration of immunity was obtained by single daily doses of vaccine made by the Harris method.

Savagnone, L. (1939). Sulla coltivabilità del virus rabbico. **[Cultivation of Rabies Virus]**.—*G. Batt. Immun.* **22.** 744–748. [English, French and German summaries].

Attempting to confirm Peragallo's report [*V. B.* **9.** 849.] that the rabies virus could be cultivated in the chorio-allantoic membrane of the chick embryo, and that bodies resembling Negri bodies were produced in the membrane, S. was unable to detect virus in the inoculated embryos, either biologically or histologically.

—U. F. Richardson.

Seifried, O., & Krembs, J. (1940). Untersuchungen über die infektiöse Laryngitis und Enteritis der Katzen. II. Mitteilung. **[Infectious Laryngo-Enteritis of Cats. II]**.—*Arch. wiss. prakt. Tierheilk.* **75.** 252–261. [For part I, see *V. B.* **7.** 345].

This is a continuation of previous work. The disease has been met with in the neighbourhood of Munich for the past five years and is most frequent in January and February and least common in June and July. The acute form occurs as severe diphtheritic changes in the tonsils, larynx, and intestine. A chronic form results in polypoid thickening of the arytenoepiglottidean fold, tonsils, and intestine. The disease is almost always associated with an acute or subacute glomerulonephritis.

The infection was successfully transmitted to healthy cats by direct contact with infected animals, but in only about 30% of cases was this possible. Attempts to transmit the disease to rabbits, g. pigs, silver foxes, a hen, and a pigeon were unsuccessful. A disease resembling the natural disease in cats was encountered in racoons fed on cat flesh and was transmitted

to healthy cats by feeding them on suspensions of tissues from racoons which had succumbed to the infection. The lesions in both species were identical. Care should be exercised in the use of cat flesh for the feeding of racoons.
—E. G. White.

Stock, C. C., & Francis, T. (1940). **The Inactivation of the Virus of Epidemic Influenza by Soaps.**—*J. exp. Med.* **71.** 661–681.

This study was made to determine the capacity of various fatty acids to inactivate epidemic influenza virus and to ascertain whether virus thus inactivated could act as an efficient antigen. Suspensions of strain PR8, made from the lungs of infected mice, were used in phosphate buffer solutions of pH 8 and mixed with solutions of the various fatty acids to be tested, giving a final pH of about 7·5. Surface tension readings of the mixtures were made after 5–10 min. Tests for inactivation of the virus were made after 90 min. and 24 hours by intranasal inoculation into each of three mice kept under observation for ten days; time of death or the presence of lung lesions in survivors was noted. Control of virus activity was made with untreated virus under the same conditions, the lethal endpoint usually being determined. The immunizing capacity of soap-inactivated virus was determined by intraperitoneal injection into mice which were later tested for resistance by intranasal injection of virus.

The results show that certain fatty acids or soaps render the virus of epidemic human influenza non-infectious; the most effective acids were oleic, linoleic, and linolenic. Using oleic acid as the prototype of the effective acids, it was demonstrated :– (1) that the optimum pH was between 6·8 and 8; the virus was extensively inactivated in one hour or less with a pH below 5 or above 10, but in these experiments a pH of 6·8 was maintained; (2) that inactivation was not due solely to lowered surface tension, and (3) that the effect of fatty acids is not produced by oxidation nor does there appear to be any correlation between their unsaturation and their inactivating effect. The rate of inactivation and the ratios of reactant concentrations were studied. Quantitative comparisons of the immunizing capacity of fully active virus and virus rendered non-infectious by treatment with oleic acid showed that, while the infectious property of the virus is removed, its immunizing capacity is unaltered. The possible mechanism by which the soaps act on influenza virus is discussed.
—C. V. Watkins.

Burnet, F. M. (1940). **Influenza Virus Infections of the Chick Embryo Lung.**—*Brit. J. exp. Path.* **21.** 147–153.

A strain of unadapted, ferret-passage influenza virus produced typical infection of the chick embryo lung after inoculation into the amniotic cavity.

"The method consists in determining the position of the embryo and opening the shell over the amniotic cavity. The first procedure follows the general lines of the chorio-allantoic technique. After the membrane has dropped into the artificial air sac, it is incised with scissors. The amnion is then picked up with fine forceps and drawn through the opening in the chorio-allantois. About 0·05 c.c. of inoculum is injected into the amniotic cavity by means of a capillary pipette. The egg is sealed with a cover slip."

The state of the tracheal fluid is the best indication of infection since it appears turbid and shows granular clumps of cells. The lungs are white and firmer than normal; histologically there are marked changes in the epithelium of the parabronchi, the cells showing proliferation and degeneration; in advanced cases the whole lung becomes a disorganized mass of cells.

The amniotic fluid was usually active to a dilution of 10^{-4}, while lung emulsions were infective in low dilutions. Successful adaptation to the embryo was secured not only with the ferret strains but also with representative mouse-passage viruses, including swine influenza. Well adapted egg strains (chorio-allantoic technique) behaved irregularly.

Evidence was obtained that the above method of virus culture was specific for pneumotropic viruses, since successful results were recorded with psittacosis, whereas herpes, louping-ill, myxomatosis, and fowl pox failed to infect.—R. E. Glover.

I. Gordon, F. B., Freeman, G., & Clampit, J. M. (1938). **A Pneumonia-Producing Filtrable Agent from Stock Mice.**—*Proc. Soc. exp. Biol., N.Y.* **39.** 450–453.

II. Horsfall, F. L., Jr., & Hahn, R. G. (1940). **A Latent Virus in Normal Mice Capable of Producing Pneumonia in its Natural Host.**—*J. exp. Med.* **71.** 391–408.

I. The authors have encountered a viral disease in stock mice which may be confused with infection due to the influenza virus. The virus is present in the lung tissue of apparently normal stock mice. The initial appearance of the disease varied between the first and ninth

passage and the effect became maximal after 2–3 further passages, when death occurred on the third or fourth day. The disease could be differentiated from influenza infection on several grounds. Firstly, the mouse virus did not cause changes in the bronchial mucosa; secondly, the mouse virus caused focal necrosis of the liver, and thirdly, the mouse virus could be recovered from the liver. (Occurrence of influenza lesions in liver is rare.) The authors were unable to differentiate their virus from that described by DOCHEZ, MILLS and MULLIKEN [see *V. B.* **8.** 643.], but mice convalescent from, and immune to, influenza virus did not have any immunity to the mouse virus.

II. The authors describe a virus disease of normal laboratory mice which may complicate experimental procedures with other pneumotropic viruses. This virus, which was capable of producing a fatal pneumonia, was repeatedly isolated from mice from three out of eight sources. The virus as it occurs in normal mice is avirulent, but becomes virulent when passaged by nasal inhalation under ether anaesthesia at intervals of 7–9 days. (Successful results were not obtained by passage every 4–5 days.) Ferrets could not be infected, and the virus was non-pathogenic for other laboratory animals and some species of rodents. All strains of virus were identical and could readily be differentiated from the viruses of human influenza and swine influenza.

The virus is extremely labile, being rapidly inactivated at room temperature. The addition of horse serum or retention at a low temperature (–76°C.) increases its stability.

Evidence is also produced to show that the virus is different from other viruses which have been found in normal mouse lungs.—J. S. P.

NAGANO, Y., & SONODA, T. (1940). Vaccination contre la fièvre de la Vallée du Riff avec le virus inactivé par la chaleur. **[Vaccination against Rift Valley Fever by Virus Inactivated by Heat].**—*Rev. Path. comp.* **40.** 16–21.

Formalinized Rift Valley fever vaccine [see *V. B.* **5.** 628.] was prepared by adding 1 : 400 formalin to virulent mouse blood or 1 : 30 liver suspension. The mixture was kept at 4°C. for three days and the formalin then neutralized. This vaccine was inactive and produced a good immunity when tested in mice. The time at which virulent liver suspension became inactive after heating at various temperatures was ascertained. A suspension heated at 56°C. for one hour was used as a vaccine, although it appears that it contained traces of liver virus which were sometimes capable of producing disease. The immunity was not so reliable as that produced by the formalinized vaccine. Virulent liver suspension diluted to such an extent that it just failed to produce disease did not produce immunity. It was therefore concluded that the immunity produced by the vaccines was due to a true inactivation of the bulk of the virus and not to the mere survival of small traces of fully active virus.

[This work has raised a number of fundamental questions but the small number of the experiments, and their planning, make it impossible to draw any valid conclusions.]

—JOHN FRANCIS.

SABIN, A. B. (1940). **Constitutional Barriers to Involvement of the Nervous System by Certain Viruses.**—*Science.* **91.** 84–87.

Old and young mice were found to be equally susceptible to the intracerebral inoculation of vesicular stomatitis virus. Young but not old mice were also susceptible when inoculated by other routes. After intranasal inoculation in old animals the virus was arrested in the anterior olfactory region and it was shown that this arrest was due, not to a rapidly acquired tissue immunity, but to a pre-existing barrier. In old animals following intraocular inoculation, the virus did not pass beyond the eye and this was probably due to the resistance of the retinal nerve cells. Although old mice were susceptible to the intrasciatic inoculation of virus they were resistant to intramuscular inoculation. This was partly due to failure of the virus to multiply in the muscle of old mice and partly due to an insusceptibility of the myoneural nerve junctions to invasion. G. pigs developed the same barriers as mice but at a much earlier age.

Young and old mice were equally susceptible to the Eastern strain of equine encephalomyelitis virus by the intranasal or intracerebral route. Following intramuscular or intraperitoneal injection the virus multiplied and circulated in the blood of both young and old mice, but old mice were resistant to the disease because in these animals the virus could not traverse the capillary walls and so failed to reach the olfactory mucosa.

In these experiments almost all animals in which constitutional factors had arrested infection, later developed a specific immunity, including the presence of humoral antibodies.

It is therefore suggested that, at least as regards the neurotropic viruses, the presence of specific immunity in the absence of previous clinical disease may be the result of an inherent persisting resistance of the animal.—J. Francis.

Kaiser, M. (1939). Ueber den Einfluss von Joddämpfen auf einige Virusarten. **[The Influence of Iodine Vapour on Some Viruses]**.—*Arch. ges. Virusforsch.* **1.** 237–246.

The toxicity of iodine for virus suspensions was studied by drawing the vapour from freshly prepared Lugol's solution through the suspension at reduced pressure. Vaccinia virus treated in this way was inactivated within 30 sec., and myxoma in 5 min. Fixed rabies virus in a thick suspension was not inactivated by prolonged treatment. Iodine acts directly and irreversibly on the virus, for subsequent aeration of the suspension or addition of sodium thiosulphate did not restore the activity.—J. B. Brooksby.

Kaiser, M. (1939). Die Trockenkonservierung von Virusarten. **[Dry Preservation of Viruses]**.—*Arch. ges. Virusforsch.* **1.** 85–90.

Vaccinia virus was freed as far as possible from tissue by grinding in a ball mill, and subsequently centrifuging the suspension. In order to give bulk to the dried material, 2–3% gelatin or polysaccharide was added to the supernatant fluid. A bacteriostatic agent ("zephirol") was used with good results in the preservation of dried vaccinia virus. The loss in titre of dried virus was less than that of virus stored in glycerin phosphate. Vaccinia, pigeon pox, ectromelia, myxoma, and canary pox viruses have been studied.—J. B. B.

Schmidt, S. (1939). Die Bedeutung der Adsorption für die aktive Immunisierung gegen Viruskrankheiten. **[The Importance of Adsorption in Active Immunization against Virus Diseases]**.—*Arch. ges. Virusforsch.* **1.** 215–236.

This article is a review of earlier work on adsorption of viruses by aluminium hydroxide with a discussion of the mechanism of immunization by such agents. Good results on an experimental scale have been obtained with fowl plague and poliomyelitis, but experiments on equine encephalomyelitis and avian leucosis have not encouraged the use of adsorbates in these conditions. The bulk of the paper deals, however, with the conditions of adsorption of the virus of foot and mouth disease, and with the development of the Waldmann-Köbe vaccine.

Adsorption and inactivation of F. & M. disease virus by aluminium hydroxide takes place most rapidly at from 20°–37°C., but the antigenic value of the product is only one-tenth of that prepared more slowly at 0°C. Type specificity is not lost on adsorption, and S. considers that type C > type A > type O in potency of antigen. Immunity is developed in four days after subcutaneous injection of adsorbates into g. pigs, although some are immune in two days; after five months the immunity is no longer solid. It is stated that no virus is set free at the site of inoculation, since none can be recovered from the blood, urine, or tissues remote from the inoculum, and elution of the virus *in vitro* is extremely difficult. The adsorbate gives rise only to very slight local lesions when inoculated intradermally into g. pigs. When the inoculum is collected from an animal several weeks after inoculation, it is found to be still capable of immunizing another animal. S. considers that the material at the inoculation site plays an all-important part as a reservoir of antigen, from which there is a slow leakage into the circulation, a strong and fairly durable immunity being set up.—J. B. Brooksby.

Andrewes, C. H. (1940). **The Occurrence of Virus III in Rabbits in the Lesions of Infectious Fibroma and of a Transplantable Sarcoma.**—*J. Path. Bact.* **50.** 227–234.

Inclusion bodies typical of virus III appeared in the testicles of rabbits used for the propagation of infectious fibroma. It is known that in certain carcinomas, but not in normal rabbit testes, virus III can persist indefinitely. It was found that fibroma lesions favoured the growth of virus III, but that virus III caused the premature regression of the fibroma, and when present in excess caused the complete suppression of the skin lesions caused by the fibroma virus. When the RS 1 sarcoma of Andrewes and Ahlström [see *V. B.* **9.** 392.] became infected with virus III, however, only local necrosis resulted and the growth of the tumour was apparently unaffected. Various means of separating the tumour and virus III mixtures are described.—John Francis.

PARASITES IN RELATION TO DISEASE [GENERAL]

HOLZER, G. (1938). Przyczynek do rozpoznawania niektórych gatunków pasożytów w przewodzie pokarmowym koni za pomocą odczynu strącania (precipitacji). [**Demonstration of *Gastrophilus*, *Parascaris* and *Strongylus* in the Digestive Canal of Horses by Precipitation Tests**]. —*Thesis, Lwów.* pp. 16. [German summary].

In a preliminary series of tests on rabbits, extracts were prepared of *Gastrophilus*, *Parascaris* and *Strongylus*; in each case the extract was suspended in normal saline and injected into the rabbits at intervals of two days until five doses had been given. The sera of the rabbits was then tested for the presence of precipitating antibodies against the antigens. Positive results were obtained.

Precipitin tests were then done on the sera of 120 army horses; results are given in three sections according to the age groups of the horses (4–7, 8–13, and 14–19 years). So far as the results could be checked by a few P.M. examinations and by the results of anthelmintic treatment with carbon bisulphide and oil of chenopodium, the tests appeared to have some specificity for their respective infestations.

PEARSE, A. S. (1939). **Parasite.**—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 3–7. Osaka: Osaka Natural History Society. [In English].

P. gives the various meanings which have in the past been associated, by botanists and by zoologists, with the terms "parasite", "commensal", and "symbiont". He then discourses on the various types and degrees of parasitism possible among animals.

In commenting on the fact that the above-mentioned terms have each a particular meaning and that there is no general term for an organism found living in or on another, but whose relationships to this other are not known, P. suggests for such organisms, whether parasites, commensals, or symbionts, the term "consors" (pl. "consortes").—E. S.

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

LINDQUIST, A. W. (1940). **The Introduction of an Indigenous Blowfly Parasite, *Alysia ridibunda* Say, into Uvalde County, Texas.**—*Ann. ent. Soc. Amer.* **33.** 103–112.

The braconid parasite, *A. ridibunda*, which is fairly generally distributed in the eastern states of U.S.A. and in parts of Canada, was reared in large numbers on larvae of *Lucilia* spp. and other blowflies, and over 50,000 were liberated in Uvalde County, Texas, in 1934–35. The dispersion and survival of the parasite was determined by exposure of meat baits. By the second year it was recovered up to 27 miles away from the release point. The parasite was very numerous during the summer of 1935, and was recovered from an average of 37% of the blowfly larvae of exposed baits. During the next years its numbers rapidly dwindled, and only two and three specimens respectively were seen during the following two years.

Parasitization, both in the field and laboratory, occurred to the greatest extent in *Sarcophaga* larvae. Parasitization of the screw-worm, *Cochliomyia americana*, resulted in death of the parasite and host.—J. MACLEOD.

SIMMONS, S. W. (1939). **Digestive Enzymes of the Larva of the Cattle Grub Hypoderma lineatum (de Villiers).**—*Ann. ent. Soc. Amer.* **32.** 621–627.

The anatomy of the digestive tract of *H. lineatum* larvae is briefly described, and results are given of tests for the presence of digestive enzymes in the salivary glands, and fore-, mid-, and hind-gut. The contents and the tissues of the mid- and hind-gut were tested separately. S. concludes that glycogenase, lipase, trypsin, and erepsin are secreted by the larvae. Lactase, maltase, and invertase, present in the gut contents, are probably synthesized by bacteria either in the warble cyst or in the gut.

As the enzymes of neither the fore-gut, the salivary glands, nor the hind-gut are markedly proteolytic, it is suggested that perforation of the hide results from enzymes regurgitated with ingesta from the mid-gut.—J. MACLEOD.

HAFEZ, M. (1939). **Some Ecological Observations on the Insect Fauna of Dung.**—*Bull. Soc. Fouad Ier Ent.* **23.** 241–287. [In English]. [Abst. from abst. in *Rev. appl. Ent.* **28.** 210–211].

A detailed account is given of observations and experiments on the fauna of dung in Egypt, with particular reference to the habits of *Musca domestica vicina*, the common house fly. The favourite breeding place of this fly in and near Cairo is horse dung, and in the country, donkey dung. In both cases, the stables are infrequently cleaned but fresh litter is supplied, so that the floors are covered with a fairly thick layer of dung kept moist by the urine of the animals, and larvae are extremely abundant in this. Oviposition does not take place in single horse droppings scattered in fields and on roads, probably because they dry up too rapidly and are broken up by birds. The presence of larvae in the small heaps deposited in fields appears to depend on the temperature of the dung. In small masses, the temperature of the surface layers is about 25°–35°C. and ovipositing females are attracted, whereas if the dung is piled in cone-shaped heaps, fermentation takes place and the surface temperature may be sufficiently high to be repellent.

The great bulk of dung on farms is that of cows and buffaloes, in which larvae were only twice found. Pig dung is more attractive than horse dung, but is of very limited distribution. Camel dung is much less attractive than horse dung. The importance of these breeding media is decreased by the prevalent habit of making them into dried disks for use as fuel. Any larvae that hatch are probably killed by exposure of the disks to the sun during the summer; no larvae of *M. domestica vicina* were seen in them.

Nieschulz, O. (1939). Over de mechanische overbrenging van ziekten door bloedzuigende insecten. [**Mechanical Transmission of Diseases by Blood-Sucking Insects**]. — *Tijdschr. Diergeneesk.* **66.** 603–606.

During recent years the transmission by blood-sucking insects of anthrax, pasteurellosis, trypanosomiasis, and some infections due to streptococci and filtrable viruses, has been demonstrated. The principal agents are tabanids (*Tabanus*, *Chrysops*, and *Haematopota*), muscids (*Stomoxys*, *Musca*, and *Glossina*), mosquitoes (*Armigeres*, *Anopheles*, and *Aëdes*), and fleas.

N. enumerates the insects which mechanically transmit anthrax, pasteurellosis, surra, and fowl pox. He points out that the possibility of transmitting a disease depends on various factors, *viz*, genus of the insect, species of the animal infected, virulence of the infection, and length of intervals between the " bites ". The duration of the transmission period varies considerably. It is 210 days with *Anopheles maculipennis* in fowl pox; 14 days with *Chrysops* in bacterial infections; six days with tabanids in pasteurellosis, and 24 hours with *Glossina* in trypanosomiasis.

The results given by experiments under laboratory conditions are different from those obtained in the field. Direct transmission of surra is successful in 1 : 30 of the small laboratory animals, but falls to 1 : 1,000 in horses in the field.—L. Tobback.

Whitfield, F. G. S. (1939). **Air Transport, Insects and Disease.**—*Bull. ent. Res.* **30.** 365–442.

W. gives a comprehensive summary of the literature on insects found in aircraft and adds records of collections from all planes stopping at Khartoum airport over the period 1935–38. He concludes from the types of insects found that they generally enter grounded planes. Among the insects of veterinary importance which survived flights are listed *Aëdes* spp. (known to transmit equine encephalomyelitis, blue-tongue, fowl pox, and canine filariasis), *Stomoxys calcitrans*, and *Culex fatigans*.

The significance, from the medical, veterinary, and agricultural viewpoints, of these findings and those of other workers is emphasized in the light of recent knowledge of the epidemiology of yellow fever and malaria. Suggestions are made for the administration of control measures, upon which more research is urged.—J. MacLeod.

Nash, T. A. M. (1940). **The Effect upon *Glossina* of Changing the Climate in the True Habitat by Partial Clearing of Vegetation.**—*Bull. ent. Res.* **31.** 69–84.

Two " islands " of true forest, 330 yards apart, at Gadau, northern Nigeria, were kept under observation for a year, and then the dense peripheral thicket, which insulates such forest patches from climatic extremes, was removed from one " island ". During the preliminary observation period the density of the tsetse population (*G. morsitans* and *G. tachinoides*), judged by fly rounds and pupal counts, and the pupal mortality, estimated by burying experimental lots of pupae in the surface soil, were closely similar in the two islands. After removal of the thicket windbreak, the evaporation rate in the experimental forest was greatly increased during the dry season and early rains, with a slight corresponding increase of day temperature. The number

of *G. tachinoides* fell steadily in comparison with those in the control " island ", until the onset of the rains. Pupal mortality increased, and pupal density decreased, until, shortly before the rains, breeding had practically ceased. The *G. morsitans* population was not markedly affected.

During the rains the *G. tachinoides* population in the experimental " island " reverted to normal, since at this season immigration was possible across the inadequate barriers of clearing. Thus, after the rains, the two areas were once more comparable. Dense clumps of ebony seedlings which had been left when the thickets were removed were now thinned down, and observations were continued for another year. The further clearing resulted in the virtual disappearance of *G. tachinoides*, but had little or no effect on *G. morsitans*.

Evidence is given that the decrease in population numbers is chiefly due to the increased evaporation. An observed increase in the soil water content of the experimental " island " may be related to the increased pupal mortality. It is suggested that, in regions where during the hot season the climate approaches the critical limit for *G. tachinoides*, extermination of the species may be accomplished merely by thinning out the vegetation in the true habitat, and thus exposing the flies to conditions of increased evaporating power. Timber may thus be spared, leaving shelter for grazing cattle, and clearing costs will also be reduced.

—J. MacLeod.

*Zumpt, F. (1939). Das Tsetseproblem im britischen Mandatsgebiet Tanganyika. **[The Tsetse Problem in Tanganyika].**—*Umschau.* Part 18. Reprint pp. 4. [Abst. from abst. in *Rev. appl. Ent.* **27.** 188].

Glossina swynnertoni, *G. morsitans*, and *G. pallidipes* are the species of most importance in Tanganyika from the point of view of human and animal trypanosomiasis. All three occur in the savannahs and can live in regions which are completely arid in the dry season, needing only a little shade in which to deposit their larvae. *G. palpalis* is confined to the damp forests on the banks of Lake Victoria and Lake Tanganyika.

*Kratz, W. (1940). Die Zeckengattung Hyalomma Koch. **[The Genus *Hyalomma*].**—*Z. Parasitenk.* **11.** 510–562. [Translation of abst. in *Zbl. Bakt. I.* (*Ref.*). **138.** 525].

The species of *Hyalomma* are mainly parasites of large mammals and are suspected or known to be vectors of some serious diseases, *e.g.* anaplasmosis and *Theileria dispar* infection. K. describes the genus and species; there are certain difficulties in classification, as on the one hand the distinction between species is often slight, and on the other hand some species have, through wide distribution in the Old World, acquired the characters of distinct races. Individual variation is also considerable. Whether species or geographical or individual forms are in question can often be determined only by breeding.

Hofmeyer, C. F. B., & du Toit, R. (1940). **A Note on the Occurrence of the Ear Mite, *Otodectes cynotis* Hering, in the Union of South Africa.**—*J. S. Afr. vet. med. Ass.* **11.** 67–69.

This is the first record of the occurrence of *O. cynotis* in South Africa, though its presence had previously been suspected. The parasite was found in the ear of a cat at Umtata in the Transkei district of the Cape Province. It was present in large numbers in all stages of development. Treatment with olive oil mixed with sulphur and naphthol was suggested.

—E. M. Robinson.

PARASITES IN RELATION TO DISEASE [HELMINTHS]

*van den Berghe, L. (1939). Les schistosomes et les schistosomoses au Congo belge et dans les territoires du Ruanda-Urundi. **[Schistosomes and Schistosomiasis in the Belgian Congo and Ruanda-Urundi].**—*Mem. Inst. roy. Colon. belge.* Sect. Sci. nat. Méd. **8.** Reprint pp. 152.

Animal schistosomes found in the Belgian Congo include *S. bovis* in cattle and antelopes, *S. bovis* var. *matthei* in cattle, and *S. margrebowiei* in antelopes. Bovine schistosomiasis is much less common in the Congo than in the Sudan and in South Africa, and usually occurred only in animals imported from Rhodesia. *S. bovis* was found always in the portal and mesenteric veins, never in those of the bladder and spleen.

The work is largely ecological in scope and contains a list of mammals and birds in which schistosomes have not been found.—J. E.

LAL, M. B. (1939). **Studies in Helminthology —Trematode Parasites of Birds.**—*Proc. Indian Acad. Sci.* Sect. B. **10.** 111–200.

A collection of notes on, and descriptions of, trematodes of Indian wild birds.

PANOVA, L. G. (1937). Fauna anaplotsefalid ovets Leningradskoĭ oblasti. **[Tapeworms of Sheep in the Leningrad Region]**.—*Papers on Helminthology, Commemorating 30 Year Jubilee of Prof. K. I. Skryabin.* pp. 459–462. Moscow: Lenin Acad. Agric. Sci.

The incidence of *Moniezia* infestation in sheep was found to be high (50–73%) in the Leningrad area; *M. expansa* and *M. benedeni* are the species usually found.

VENARD, C. E. (1938). **Morphology, Bionomics, and Taxonomy of the Cestode Dipylidium caninum.**—*Ann. N.Y. Acad. Sci.* **37.** 273–328.

The dog flea, *Ctenocephalus canis*, was employed as intermediate host. About 75% of flea eggs from a tapeworm-free dog reached maturity when they were hatched in moist sand and the larvae were fed on fragments of dog biscuit and dried bovine or dog blood. Development required 25–30 days at room temperature.

Infection was obtained by feeding flea larvae on *D. caninum* eggs concentrated in a few drops of water to which dried blood was added. It is considered that flea larvae normally become infected by eating eggs freed by the movements of a proglottid which has left the host's anus and has ruptured through desiccation. Many larvae, attempting to feed on whole proglottids, were observed to be unable to free themselves from the viscous substance, and to die attached to the proglottid.

Dogs and cats were infected by feeding them cysticercoids dissected from infested fleas. A dog and a cat were fed on the same day with cysticercoids from the same proglottid. The maximum size of the worms at P.M. examination 23 days later was 115 mm. in the cat and 250 mm. in the dog. [It is not stated whether the cat harboured the same number of parasites as the dog. Size of the individual tapeworm is known in some species to vary inversely as the number present.]

Pathological effects in the dog were noticed only in heavy infestations. Diarrhoea developed in 48–72 hours after infection, and subsided after a few days. Severe haemorrhagic enteritis was often associated with the presence of 100 worms or more.

There was heavy mortality among infected flea larvae, and infected adult fleas were sluggish in their movements, and thus more susceptible to ingestion by the dog.

After studying the degree and types of normal variation that occur in the adult cestode, V. rejects as invalid all but three species of *Dipylidium*, namely, *D. caninum*, *D. buencaminoi*, and *D. otocyonis*.—E. S.

JOYEUX, C., & BAER, J. G. (1939). Recherches biologiques sur quelques cestodes Pseudophyllidea. **[Biological Research on Pseudophyllidean Cestodes]**.—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 203–210. Osaka: Osaka Natural History Society. [In French: English summary].

It is observed that cestodes confer on their hosts a premunition rather than a true immunity, *i.e.*, there is little or no protection against reinfection after disappearance of an earlier infestation.

In the tapeworm group under consideration, *Diphyllobothrium latum* has been observed by various workers to confer protection for a certain period after expulsion of the worms. *D. erinacei* appears to confer no such protection. The authors found that infected cats and dogs, given fresh plerocercoids, harboured at autopsy a few days later young as well as mature worms. *Ligula intestinalis* gives protection against reinfection for 20–30 days after the worms have been expelled or digested. Two ducks were infected seven times after the expiration of the above period.—E. S.

MATOFF, K. (1938). Zur Frage der Muskel- trichinellose beim Geflügel. **[Muscular Trichinosis in Poultry]**.—*Z. InfektKr. Haustiere.* **54.** 116–134.

This is a detailed record of experiments on the distribution of trichinae throughout the musculature, following oral administration of the parasite to young chicks and pigeons. The age of the birds varied from a few days to a month and the infective material consisted of infested muscle from rats, pigs, cats, and dogs. The examination for parasites was made either by grinding up the muscles in saline and examining the suspension in the fresh condition or, when the parasites were few, by first macerating the muscle in pepsin and hydrochloric acid. In some animals, portions of muscle were removed at biopsy and examined

for parasites.

Chicks were found to be less susceptible than pigeons to invasion of the musculature and it was usually impossible to find the parasites in the pressed muscle or muscle juice at a period of four weeks after the parasites had been given. Adult pigeons were successfully infected, but resembled young chicks in that the parasites were not demonstrable in the musculature four weeks after administration. It is of interest that in one bird a small number of trichinae were found in the muscle juice of the gizzard ; no parasites were found at a further examination four weeks after infection.

M. considers that the high degree of immunity to *Trichinella* infestation possessed by birds is due to the reaction produced in the muscles, leading to destruction or encapsulation of the parasite, in addition to the resistance to the intestinal stage which has been generally considered the important factor.—E. G. WHITE.

McCOY, O. R. (1939). **Immunity to Trichiniasis in Rats.**—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 339–341. Osaka : Osaka Natural History Society. [In English].

The author summarizes briefly the results of his earlier work on this immunity [see *V. B.* **2.** 456, 560 ; **5.** 38, and **10.** 351.], showing that it is produced most effectively by a sublethal dose of larvae, in lesser degree during a light infection, and to some extent by intraperitoneal injection of living larvae, of heat-killed larvae, or of suspensions of dried and powdered larvae ; rats kept on a diet deficient in vitamin A show a very markedly reduced immunity.

The fact that immunity against *Trichinella* can be transferred passively by serum, as shown by CULBERTSON and KAPLAN [*V. B.* **9.** 552.], indicates that an antibody is concerned in the immune reactions. Since the immunity manifests itself by a quickened removal of the infective larvae or adults from the intestine, it is here suggested that the antibody acts by sensitizing the intestine, making it unfavourable for the worms, perhaps by increasing the secretion of mucus.—E. S.

BEAMS, H. W., & KING, R. L. (1940). **Effects of Low Temperature on Survival and Mitotic Figure of Eggs of Ascaris equorum.**—*J. cell. comp. Physiol.* **15.** 409–410.

Exposure of *A. equorum* eggs to 0°C. for two months, or to –27°C. for 24 hours, did not affect their development when they were restored to normal temperatures. Sudden exposure to temperatures of CO_2 ice or liquid air proved lethal, and the eggs appeared distorted.—E. S.

HOOLE, C. G. (1939). **Pig as a Medium of Helminthiasis.**—*J. Ceylon Br. Brit. med. Ass.* **36.** 204–206.

H. urges greater sanitary precautions in pig raising in Ceylon, where it is customary for pig keepers to keep pigs in close association with human dwelling places. It was noted that where clinical cases of human helminthiasis existed, the pigs were also heavily infested with round worms, whipworms, and hookworms, and might conceivably be an important reservoir of human infection.—E. S.

CAMERON, T. W. M., & PARNELL, I. W. (1939). **Observations on the Control of Bursate Nematodes by the Chemical Treatment of Manure.**—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 319–329. Osaka : Osaka Natural History Society. [In English].

The authors believe that strongyles of animals can be most effectively controlled by treatment and disposal of the manure. They discuss the various ways in which chemicals can be used to achieve control. They describe experiments performed with this object in view, the test material used being horse sclerostome eggs. The paper ends with a list of chemicals tested, arranged in order of effective dilution. Chloropicrin and various iodides stand at the top of this list, having been proved effective at concentrations of less than 0·1 g. per 100 g. of manure. Saponin, derris, pyrethrum, and various inert compounds comprise the completely ineffective list.—E. S.

ROGERS, W. P. (1940). **The Effects of Environmental Conditions on the Accessibility of Third Stage Trichostrongyle Larvae to Grazing Animals.**—*Parasitology.* **32.** 208–225.

One of the factors in the great variation in seasonal incidence of sheep parasitism in Western Australia, is that summer conditions may be more suitable for larval migration up the grass to situations favourable for infecting sheep. The experiments described in this article were undertaken by R. to study this factor.

These experiments, which were chiefly performed in the laboratory, provide information on the optimum temperatures, light intensities, and humidities for migration of *Haemonchus contortus* and of several species of *Trichostrongylus*. Details are also given of the con-

trolling effect of soil moisture and of water lying on the soil surface on the rate of migration, the distribution of larvae on the blades of grass, and the cycle of larval migration during the day. These all show that environmental conditions do affect larval migration considerably and suggest (a) that damp cloudy weather is most favourable to ascension; (b) that dry weather is less favourable except perhaps for *H. contortus*; (c) that very wet conditions decrease infestations on herbage but increase the proportion of *Ostertagia* spp., and (d) that hot weather favours migration, particularly of *H. contortus*.

The conclusion drawn is that larval tropisms do not explain the seasonal incidence of general infestation of sheep, but that they do explain to some extent the differences in the seasonal incidence and distribution of various types of parasites.—K. M. Sanderson.

Akhtar, S. A. (1937). *Chabertia rishati* **n. sp. —a New Nematode Parasite of Camel.** —*Proc. Ind. Acad. Sci.* Sect. B. **5.** No. 2. 45–47.

A. proposes a new species of *Chabertia*, basing his description on three pairs of worms from the large intestine of a camel. The species is distinguished from *C. ovina* by being stouter, by " having small elements on only one and the anterior leaf-crown, in having eosophagus with lamellae and the male having a plate of knobs with small terminal spines in the depth of buccal capsule." [A redescription of this species in clearer terms will be needed to establish its validity.]

Kotlán, A. (1939). Zur Frage der Wirtspezifität der Lungenwürmer. **[Host Specificity of Lungworms].**—*Zbl. Bakt. I.* (*Orig.*). **144.** 411–416.

K. reviews the existing literature pertaining to lungworms and draws attention to the reported plurality of hosts infested by the various parasites. He concludes that, contrary to the generally accepted opinions, host specificity is more or less the rule in lungworms. He classifies the species with their hosts as follows.

Protostrongylus.—*P. rufescens* occurs in sheep and ? goats; *P. ocreatus* in sheep; *P. commutatus* in hares and rabbits; *P. kamenskyi* in hares; *P. capreoli* in deer; *P. sagittatus* in red deer; *P. austriacus* and *P. rupicaprae* in chamois. It is stated that earlier reports that *P. rufescens* occurs in deer and that *P. commutatus* is identical with *P. ocreatus* are the result of incorrect classification of the parasites recovered. Means of distinguishing these three species are discussed.

Dictyocaulus.—Host-specificity is well marked, although it is not as strict as in *Protostrongylus*. *D. filaria* occurs in sheep, goats, and camels, and investigations made by K. in Hungary, where deer are common and often graze on the same pastures as sheep and cattle, showed that this parasite never occurs in deer. Moreover, the reports that *D. filaria* occurs in cattle must be regarded as untrue as attempts to infest a three-month-old calf with approximately 10,000 *D. filaria* larvae were unsuccessful. The true hosts of *D. viviparus* are cattle, and K. has also found it in red deer and camels; he states that reports of its occurrence in equines are due to confusion of this species with *D. arnfieldi*.

Muellerius.—The genus is limited to the smaller ruminants—sheep, goats, and chamois. Statements that it occurs in red deer are questionable as K. found *D. viviparus* and *P. sagittatus* in the lungs of these animals. He suggests that the larvae of *P. sagittatus* have been mistaken for those of *M. capillaris*.

—A. L. Wilson.

Mikačić, D. (1940). Neke primjedbe o Protostrongylus vrstama iz pluća ovce II. **[Ovine Species of *Protostrongylus*. II].**—*Vet. Arhiv.* **10.** 86–91. [Abst. from French summary].

M. proposes the name *P. rupicaprae brevispiculum* n. subsp., for a nematode of which he has found 11 specimens in sheep [in the pulmonary parenchyma] from various [Balkan] countries, and which was mentioned in an earlier paper [see *V. B.* **10.** 349]. The species is very similar to *P. rupicaprae* Gebauer 1932, but has spicules only 112–123μ long.

Kofoid, C. A., Williams, O. L., & Veale, N. C. (1937). **Thelazia californiensis, a Nematode Eye Worm of Dog and Man, with a Review of the Thelazias of Domestic Animals.**—*Univ. Calif. Publ. Zool.* **41.** 225–233.

A useful summary is given of the occurrence and geographic distribution of *Thelazia* spp. in domestic animals. *T. alfortensis* from cattle is considered to be a synonym of *T. gulosa*, and *T. rhodesi* is reported from cattle in California. *T. californiensis* is re-described from specimens found in dogs; the authors were unable to transmit the infection experimentally.—E. S.

STEWART, M. A. (1940). **Ovine Thelaziasis.**—*J. Amer. vet. med. Ass.* **96.** 486–490.

In October 1939, from 1–12 specimens of *Thelazia californiensis* were recovered from the eyes of sheep from three widely separated flocks in California. In December, 75 specimens were taken from the eyes of a buck deer, *Odocoileus hemionus*. The sheep were affected with infectious keratitis, and although the symptoms may have been due to this condition alone, the presence of the parasites may have been a predisposing factor in its production. The observed symptoms were excessive lachrymation, ocular hyperaemia, and conjunctival petechiae.

S. discusses the treatment recommended for thelaziasis, and emphasizes the superiority of novocaine over cocaine as a local anaesthetic for use in the eye.—A. L. WILSON.

MUNDHENK, R. L., & GREENE, J. E. (1939). **Blood Parasites of the Dog.**—*J. Amer. vet. med. Ass.* **95.** 551–554.

The paper is concerned only with nematode larvae. Blood samples from approximately 200 stray dogs, all from east central Alabama and west central Georgia, were examined microscopically. 76% of the dogs had large numbers of larvae in the blood, yet less than 1% of them showed adult *Dirofilaria immitis* on P.M. examination. 92% of the infested dogs were also infested with *Spirocerca sanguinolenta*, and it is suggested that the larvae found in the blood may be stages in the life-cycle of this parasite [see also *V. B.* **10.** 525].

To ascertain whether the larvae were those of other filariids, a large number of carcasses was carefully dissected, but no parasites were found.

While moderate infestations with *D. immitis* responded readily to treatment with antimony compounds, these had no effect on the other larvae even when the dose was sufficient to cause severe antimony poisoning. Failures in the treatment of suspected heartworm infestations diagnosed solely on the finding of embryos in the blood may prove to be cases not of *D. immitis* infestation but of the unknown parasitism.—A. L. WILSON.

GARZIA, G. (1939). Lesioni aortiche da Onchocerca armillata Railliet ed Henry 1909 nei bovini dell'Africa Orientale. **[Aortic Lesions caused by *O. armillata* in Cattle in East Africa].**—*Nuovo Ercol.* **44.** 229–234.

A parasitic lesion of the aorta is described due to *O. armillata*, and frequently observed in apparently healthy bovines in East Africa. Out of 4,069 African zebus, 2,047 were affected, the incidence being much higher in the low-lying districts than in the highlands (71·96 and 9·86% respectively). The incidence in certain breeds in the highlands was greater than in others. Seasonal fluctuations were considerable; incidence in the highlands varied from 7·76% during the rains to 15·97% during the dry season, and in the lowlands from 54·17–87% respectively. Older animals showed a higher proportion and degree of infestation than young ones. Calves born and kept in the highlands were entirely free, while the affection was occasionally observed in lowland calves (under one year of age) and frequently in young animals (up to two years). The opinion is expressed that highland animals are invaded by the parasite when they are driven to the low-lying plains in search of pasture during the dry season.

Fragments found of female and male specimens of the parasite conformed in the main to the characteristics given by RAILLIET and HENRY, and by others.

Lesions caused by the parasite were situated on the aortic arch and thoracic aorta and consisted of lentil- to nut-sized nodules, occurring singly or in clusters on the surface. They were low and broad based, and might escape detection, being enclosed in connective tissue and fat. On section they contained a caseo-calcified layer in which was a gelatinous centre containing one or more parasites. Each nodule had a tract leading into the aortic lumen. Some nodules were situated in the aortic wall where they might cause aneurysms.

VAN DEN BERGHE, L., & GILLAIN, G. (1939). Sur un genre nouveau de Filaroidea chez l'éléphant au Congo Belge. **[A New Filariid from Elephants in the Belgian Congo].**—*Rev. Zool. Bot. afr.* **32.** 388–393.

The authors describe the female of *Loxodontofilaria loxodontis* n.g., n.sp., from the subcutaneous connective tissue of an African leephant at Gangala na Bodio, Uele. This is believed to be the adult form of *Microfilaria loxodontis*, discovered in the same herd in 1936 by VAN DEN BERGHE [*V. B.* **9.** 401].

The species described in 1923 by BAYLIS as *Filaria gossi*, which was found in two elephants killed in Tanganyika, is placed in the new genus as *L. gossi*. The species are distinguished by the position of the vulva, which is much nearer the anterior end in *L. loxodontis*. Males of both species are as yet unknown.—E. S.

IMMUNITY

Šlević, M. (1940). Doprinos uporednom ispitivanju nekih alergicnih metoda kod tuberkuloze. **[Comparison of Various Methods of Tuberculin Testing of Cattle].** —*Jugoslov. vet. Glasn.* **20.** 447–456. [Abst. from German summary].

The conjunctival, "sensibilization", subcutaneous, and intradermal tuberculin tests, the latter with synthetic medium tuberculin and the rest with old tuberculin, were used on 151 cattle. The intradermal test gave the highest proportion of reactions and is recommended as the most reliable and the easiest. [No P.M. examinations were made to check the results.]

Schaefer, W. (1939). Antigène protéidique et tuberculine bovine. **[Protein Antigen and Bovine Tuberculin].**—*C. R. Soc. Biol. Paris.* **131.** 746–749. [See also *V. B.* **10.** 74, and **11.** 35].

Animals were immunized with the bovine type of *Mycobacterium tuberculosis*, and protein antibody fractions were saturated by the same technique as used for polysaccharide and lipoid fractions previously described.

Protein antigen from the organism did not have the property of inhibiting complement fixation unless autoclaved for from 45 min. to three hours. This heating does not diminish the fixation of complement by the remaining lipoid and polysaccharide fractions. It is shown that the protein antigen and most tuberculins are thermoresistant. Further, most tuberculins prepared from strains of *Mycobact. tuberculosis* (bovine type) give complement fixation in the presence of an anti-bovine S serum, this being decreased or lost after trypsin digestion of the tuberculin. Any fixation which then occurs is due to polysaccharide antigen. Human and avian tuberculins fix complement only by their polysaccharide fractions. Neither human, bovine nor avian tuberculins saturate lipoid fractions.—C. V. Watkins.

Follis, R. H., Jr. (1940). **Studies on the Cellular Response in the Early Stages of the Tuberculin Reaction.**—*Johns Hopk. Hosp. Bull.* **66.** 245–252.

Dienes and Mallory (1932) reported that while the skin reaction in the early stages of an anaphylactic reaction shows an intense polymorphonuclear cell response, a dermal tuberculin reaction is characterized by a predominance of mononuclear cells. F. injected groups of tuberculous g. pigs with varying amounts of O.T. and of P.P.D tuberculin, but failed to confirm the above findings, since a histological examination of skin reactions of a comparable intensity showed that the essential feature was a polymorphonuclear infiltration. —R. E. Glover.

Fernbach, E., & Rullier, G. (1940). Sur la réaction de Millon vis-à-vis de diverses tuberculines obtenues par précipitation. **[The Effect of Millon's Reagent on Precipitated Tuberculins].**—*C. R. Acad. Sci., Paris.* **210.** 586–588.

Three tuberculin proteins were prepared by precipitation with varying amounts of alcohol. The lethal dose for the tuberculous g. pig was 10 mg. for one precipitate and 3 mg. for the others. When tested by Millon's reagent two gave a positive reaction and one was negative. It is pointed out that the Millon reaction is simply an indication of the presence of a phenol ring compound: it does not necessarily indicate a protein compound. The bearing of this finding on the significance of tuberculin protein as the active principle of tuberculin is discussed.—R. E. Glover.

Kotljarova, H., & Rogozin, I. (1937). Reakcija Burnet u ljudej i ovec s brucellinami iz različnykh stammov brucella. **[The Brucellin Test in Human Beings and Sheep, with Brucellins Prepared from Different Strains of Brucella].**—*Brucellosis in Sheep.* pp. 225–231. Moscow: Viem Publ. Dept.

After testing brucellins prepared from four different strains of *Br. melitensis*, three of *Br. bovis*, two of *Br. suis*, and one of *Br. paramelitensis*, on 245 sheep reacting positively to the agglutination test, and on 19 human patients with undulant fever, on the Commission's Experimental Sheep Farm in North Caucasus, the authors claim to have found the use of these preparations for allergic tests to be sufficiently efficacious for the diagnosis of brucella infection. The allergic activity of the preparations, however, varied considerably with the individual culture used, indicating the necessity for studying the antigenic value of each strain before brucellin is prepared from it. When injections of brucellin were given to the human patients at intervals of 15 days, the intensity of the skin reactions was diminished; this is attributed to partial desensitization.

I. Mazza, S. (1939). Pruebas de aglutinación sobre *Brucella* con sueros de vacas de tambo de la cuidad de Jujuy. **[Agglutination Tests for Brucellosis on Cows at Jujuy, Argentina]**.—*9th Reun. Soc. argent. Pat. reg. N.* **3.** 1777–1779.

II. Mazza, S., & de Barnardi, B. (1939). Pruebas de aglutinación sobre *Brucella* con sueros de animales sacrificados en el matadero de Paraná (Entre Rios). **[Agglutination Tests for Brucellosis on the Sera of Slaughtered Animals at Paraná Abattoir, Entre Rios]**.—*Ibid.* 1825–1827.

I. M. performed aggln. tests for brucellosis on 623 cows, using Huddleson's method and antigen. Sera from 129 of these animals gave positive reactions at titres varying from 1 : 25–1 : 500. The cows giving positive reactions were mostly animals of Dutch or partly Dutch breeds, native breeds showing a much lower incidence. M. suggests that *Br. abortus* was not introduced into the country until Dutch breeding stock was imported to improve the native breeds. He considers that the presence of *Br. melitensis* infection is of much longer duration.

The sera showing high titres in the tests with *Br. abortus* were also tested with *Br. melitensis* and all gave positive results, some with titres as high as 1 : 20,000.

M. also performed aggln. tests on the sera of the workers on the affected premises, but only in one case did he get a positive result.

II. Carrying out tests for *Br. abortus* with sera from slaughtered animals, the authors obtained 160 positive results in 745 sera examined. Of the 160 positive, 70 had titres of 1 : 500. The positive sera were also tested with *Br. melitensis* (live suspension) and gave agglutinations at titres practically the same as with *Br. abortus*.

Workers in the abattoir were examined, but only in one case was a positive reaction obtained, and that at 1 : 25.

Sera from 18 pigs were tested with one positive at 1 : 200. Some sheep sera were also tested, but were all negative.—M. Watson.

Tropa, E. (1939). Sôbre o valor adjuvante do pó de tapioca e da saponina na produção de aglutininas brucélicas. **[Value of Tapioca and Saponin for Stimulating the Production of Brucella Agglutinins]**.—*Rev. Med. vet., Lisboa.* **34.** 103–106. [French summary].

Using as antigen a suspension of *Br. abortus* with the addition of 0·75% of powdered tapioca, T. injected a number of sheep both subcutaneously and intravenously. Control animals received only a bacterial suspension without tapioca. Another group of sheep was treated with an antigen consisting of bacterial suspension plus 1% saponin, control animals receiving bacterial suspension alone.

In both cases the addition of the non-bacterial matter to the antigen stimulated the production of agglutinin considerably.—M. W.

Grycz, E., & Teklinski, A. (1938). Porównanie wyników odczynów agltynacji i wiazania dopełniacza przy brucelozie bydła. **[Comparison of the Results Obtained in the Diagnosis of Bovine Brucellosis by Agglutination and Complement-Fixation Tests]**.—*Pam. pańs. Inst. nauk. Gosp. Wiej. Puławy.* No. 2. pp. 46–55. [Suppl. to *Wiad. weteryn.* **18.** No. 223]. [Abst. from French summary].

The authors tested 3,138 samples of bovine blood for *Br. abortus* by the aggln. and c.-f. tests and describe their technique; the aggln. test gave 804 positive, 247 doubtful, and 2,087 negative reactions, and the c.-f. test 858 positive, 104 doubtful, and 2,176 negative reactions, thus showing a difference of 2·83% on the positive results and 8·51% on the doubtful reactions. On the basis of these results the aggln. test is preferred for large-scale testing on account of its simpler technique, but in doubtful cases the additional use of the c.-f. reaction is recommended owing to its greater sensitivity.

Acevedo, R. A. (1940). **A Method of Preparation of Antigen for Surra Complement-Fixation Test.**—*Philipp. J. anim. Indust.* **7.** 219–224.

Satisfactory modifications and improvements on the older methods of preparing antigen of pure trypanosomes from rats for the c.-f. test for surra have been developed. The method involves the use of 20% potassium oxalate solution instead of 1% sodium citrate solution. Slow centrifugation produces a more complete separation of trypanosomes from blood cells, and thus the antigen is free from considerable amounts of anti-complementary red cell stroma and haemoglobin. A single passage of the trypanosomes, maintained in g. pigs, through rats ensures that the blood of all the rats subinoculated for antigen preparation is teeming with trypanosomes at the same time.—M. L. B.

REYN, Alice. (1940). Komplementbindungsversuche bei Maul- und Klauenseuche. **[Complement-Fixation Tests in Foot and Mouth Disease]**.—*Acta path. microbiol. scand.* **17.** 145–171. [In German].

The antigen used in these experiments was prepared by centrifuging a suspension of epithelium, and incubating it at 37°C. for two days in the presence of 1% formol. Fixation of complement was carried out at 18°C. for 18 hours, a procedure found to give better results than fixation at 37°C. for 45 min. followed by 18°C. for another 45 min. For haemolysis, 60 min. at 37°C. was allowed, the test being read after a further 18 hours at 4°C.

G. pig sera from animals convalescent 7–10 days from types O and A infections were found to give type-specific c.f. The sera giving the highest titre were obtained 20 days after infection; at 40–60 days the titre was much lower, and, later than this, c.f. was not possible. The c.-f. titre therefore corresponds to the presence of immune bodies in the sera. Type specificity was not obtained in experiments with cattle sera. False positive reactions were given by convalescent cattle sera with formolized, virus-free antigen prepared from g. pig and cattle kidney emulsion. Formol-free antigen filtered to maintain sterility during incubation gave correct negative results with normal sera, but there was no c.f. with this antigen and convalescent cattle sera. R. suggests that the loss of antigen on filtration is the cause of this failure, and considers that further work on these lines holds out possibilities of results equal to those obtained in g. pigs. Studies were made of human sera from 16 suspected cases, from one of which virus was recovered. Weak positive reactions were obtained with type O g. pig antigen in 60% of these, and 44% false positive reactions were found with 216 sera of normal subjects and the same antigen.

—J. B. BROOKSBY.

SCHNEIDER, L., & SZATHMÁRY, J. (1938). Ueber die Immunität der neugeborenen Säugetiere. I. Mitteilung. **[Immunity of Newborn Mammals. I]**.—*Z. Immun-Forsch.* **94.** 458–465.

SCHNEIDER, L., & SZATHMÁRY, J. (1938). Ueber die Immunität des neugeborenen Kalbes. II. Mitteilung. **[Immunity of Newborn Calves. II]**.—*Ibid.* 465–469.

I. The newborn animal may acquire an immunity from its mother through the placental vessels or by the colostrum. The first consideration concerns the relationship between the uterine mucous membrane and the egg, and it is claimed that this should be viewed from the ontogenetic aspect. In primitive placentation, blood must pass through seven layers from the mother to the foetus. These layers are :– maternal vascular endothelium, uterine binding tissue, uterine epithelium, uterine lumen, chorion epithelium, chorion binding tissue, and foetal vascular endothelium. In some highly organized mammals certain layers are reabsorbed, as for example in the human subject in which the layers are reduced to three in number. There are four groups as follows. (1) Placenta epithelio-chorialis :– seven layers as in pigs, horses, asses, camels, tapirs, goats, and cows. (2) Placenta syndesmo-chorialis :– five layers as in sheep and deer. (3) Placenta endothelio-chorialis :– four layers as in dogs, cats, wolves, foxes, and jackals. (4) Placenta haemo-chorialis :– three layers as in man, the higher apes, and various rodents such as rabbits, g. pigs, rats, mice, bats, hedgehogs, and squirrels.

Only the first and last groups can be regarded as clear cut, and if the mother has an active immunity then it is transmitted *via* the colostrum in the first group and *via* the placental vessels in the last group. It is thus shown that the transmission of immunity is related to the histological structures of the tissues which exist between mother and foetus.

II. The second paper deals with experiments designed to show the method of transmission from cow to calf; as is indicated, the method is by the colostrum. An account is given of the immunization of a cow against diphtheria toxin and typhoid bacilli. Antibodies were measured in the udder secretion and in the blood of the mother and the newborn calf. There was a higher concentration in the udder secretion than in the blood of the mother. At birth, the serum of the calf contained no demonstrable typhoid agglutinins and only a minute amount of diphtheria antitoxin. Within 90 min. of the first suckling a marked rise in antibodies occurred in the serum of the calf. The titres were gradually reduced within a week or more and the antibody content of the udder secretion of the mother decreased rather rapidly. The antibody content of the mother's serum decreased much less rapidly.

—R. LOVELL.

STOLL, N. R. (1940). **Worm-Host Systems as Labile Mechanisms: A View of the**

Nematode-Ruminant Problem.—*J. Amer. vet. med. Ass.* **96.** 305–308.

S. discusses the adaptability to change of worm-host relationships, and summarizes our present knowledge of helminth immunity as follows. (1) Exposed sheep may build up a *Haemonchus contortus* infestation of marked pathogenicity, until a crisis occurs, when the infection is discharged in whole or in part, and reinfection does not take place at the same rate as before. (2) The same phenomena have been demonstrated for other species; the assumption now is that immunity will develop, rather than the reverse, as was believed a few years ago. (3) These immunities are usually not "sterilizing immunities", *i.e.*, a few worms may be left in the host, which is probably a reason why functional immunities against helminths were for so long unrecognized. (4) Immunity is specific—where animals are exposed to a mixed infestation, it is probable that they become immune to each species separately if and when they pick up sufficient numbers of that species. (5) Under certain conditions, the host-parasite relationship gets out of hand and favours the worms at the expense of the host. Such conditions are the too rapid infestation of young animals on old pastures, transfer from lightly infested pastures to crowded enclosures, close cropping of pastures during dry seasons, and lowered resistance due to excessive constitutional strains, such as may be produced by breeding, lactation, severe chill, fright, or physical injury.

S. expresses the hope that, as knowledge accumulates, the natural mechanism of immunity may become a useful tool for the immunization of susceptible animals.—E. S.

CHANDLER, A. C. (1939). **The Nature of Local Immunity in Parasitic Infections.** —*Vol. jubil. Prof. Sadao Yoshida.* **2.** 343–364. Osaka: Osaka Natural History Society. [In English: abst. from author's summary].

Local immunity should not be confused with general tissue immunity or with locally manifested general immunity. The immunity in malaria appears to belong to the latter category. Parasites in the circulatory system or enclosed body cavities, or embedded in internal tissues would not be expected to give rise to local immunity, whereas parasites located in skin, in the lumen or lining of the intestine, or of the biliary, urinary, genital, or respiratory passages may do so. Local immunity as described in bacterial infections is sometimes dependent upon cell mobilization, and may not always be strictly specific.

A local immunity to toxic effects has been demonstrated in *Cochliomyia americana* infestation. A different type of local immunity, directed against the nutrition and vitality of the parasites, has been demonstrated in infestation with *Cordylobia* larvae. The development of the latter type of reaction against *Cordylobia* and not against *Cochliomyia* is believed to be due to subsistence on living tissue by the former and on proteolysed tissues by the latter. It is suggested that in the case of other tissue-feeding parasites, the host tissue modified by digestion may serve as an antigen.

A true local immunity, entirely independent of the presence or absence of a general immunity accompanied by antibody response, occurs in coccidiosis. The functional immunity apparently depends upon failure of food supply for the parasites, and a sloughing-off of the cells injured by invasion of the sporozoites.

In most intestinal helminth infections there are two phases of immunity:—(1) a reaction to parenteral migration or mucosal burrowing of the larvae before they grow to maturity, and (2) a reaction to the adult parasites in the intestine. Parenteral migration such as occurs in hookworms, *Nippostrongylus*, *Strongyloides*, and *Ascaris*, stimulates a general immunity which is shared by the intestinal mucosa. Mucosal burrowing may not be highly effective in producing a local reaction interfering with nutrition, since the burrowing larvae are demonstrably not dependent upon living tissues for sustenance; an immunity similar to the general immunity to migrating parenteral larvae may, however, be developed, although more rapidly, due to the localization of the parasites. The type of immune reaction to adult intestinal worms is largely influenced by their feeding habits. Those like *Nippostrongylus* and *Strongyloides* which feed on mucosal tissue stimulate a local immunity directed against their nutrition. Those which feed on blood are affected only by a general immunity either resulting from repeated parenteral migration of the larvae, or gradually built up by the slow absorption of antigenic material picked up by tapped blood or lymph vessels. Those which feed on intestinal contents would presumably stimulate no immune reaction whatever; the readiness with which resistance is acquired to such worms as *Ascaridia* and *Heterakis* suggests some dependence on host tissue throughout the

lives of the worms.

In trichinosis there are also two phases of immunity, intestinal and parenteral. The intestinal phase develops first, is local, and confers a high degree of protection. The parenteral phase develops later, is general, is manifested by eosinophilia and precipitins, can be duplicated by vaccination, and has a relatively feeble protective action. The local functional immunity may be quite independent of the general serological reaction.

PETTERSSON, A. (1939). Ueber die Immunität gegen die negativ chemotaktische (negataktische) Substanz der Bakterien. **[Immunity against Negative Chemotactic Substance of Bacteria]**.—*Zbl. Bakt. I.* (*Orig.*). **144.** *83–88*.

P. discusses this subject with particular reference to *Bacillus anthracis*, staphylococci, and pneumococci, tables from earlier experiments being reproduced. He concludes that the most important antibody of immune sera against *B. anthracis* and *Staph. pyogenes* is *antinegataktische*, *i.e.* presumably one which favours phagocytosis of the bacteria by neutralizing the factors which prevent this phagocytosis. Antitoxic action against staphylococci is freely conceded as valuable, but is regarded as on the whole unnecessary since it only prevents symptoms whilst conditions are becoming suitable for phagocytosis, which is the essential method by which the staphylococci are got rid of.

Experiments are reported showing that a staphylococcus antiserum prepared in a sheep had a protective power similar to that of two commercial antisera, although its antihaemolytic titre was at least 20 times lower. This sheep serum was, on the other hand, shown to have an antileucocidin titre greater than those of the commercial sera and, by subcutaneous injection of mixtures of virulent cocci and serum into g. pigs, an equal power to promote phagocytosis.

Pneumococci produce, in addition to a substance of negative chemotactic nature, one which is leucocidic, and the injected animal must also produce antibodies to neutralize this factor. One of these factors is often absent and as a result, although leucocytes and pneumococci may be observed in close contact, no phagocytosis can be seen.—A. W. STABLEFORTH.

HILL, A. B., HATSWELL, J. M., & TOPLEY, W. W. C. (1940). **The Inheritance of Resistance, Demonstrated by the Development of a Strain of Mice Resistant to Experimental Inoculation with a Bacterial Endotoxin.**—*J. Hyg., Camb.* **40.** 538–547.

A partially purified toxic fraction of *Salmonella typhi-murium* [see *V. B.* **4.** 762.], consisting of the somatic antigen or antigens, was chosen as the selective agent, thus eliminating the difficulties associated with the use of living bacteria in a study of this nature. Ten generations of mice (with one exception) were inoculated, the next generation being bred each time from the survivors to this test. In the ninth and tenth generations combined 64% of the mice with resistant ancestors survived, but in the case of the control stock the figure was only 14%. Despite this result it was found that when mice of these generations were inoculated with *Salmonella typhi-murium*, in place of the toxic fraction, they were less resistant than the control stocks.—JOHN FRANCIS.

TUFF, P. (1940). Nedarvning av sykdomsresistens hos dyr. **[Inheritance of Resistance to Disease]**.—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 842–863. Discussion pp. 863–865. [English summary].

A review of the literature on lethal factors and on inherited predisposition for or resistance against diseases, with special reference to tuberculosis, brucellosis, swine fever and swine plague, Aujeszky's disease, mouse typhoid, fowl typhoid, pullorum disease, avian coccidiosis, and fowl paralysis.

In the discussion MAGNUSSON mentioned the need for research on the inheritance of resistance against foot and mouth disease. In the last outbreak an attempt was made to start such an investigation, but little progress could be made owing to the shortage of veterinarians who could be spared for such work.—J. E.

SOHIER, R., & JAULMES, C. (1939). La perméabilité de la barrière vasculo-meningée aux anticorps chez l'homme. Recherches sur les antitoxines tétanique et diphtérique. **[Permeability of the Blood Brain Barrier of Man to Antibodies]**.—*Rev. Immunol.* **5.** 241–271.

Diphtheria and tetanus antitoxins are able to pass from the blood into the cerebrospinal fluid through the meningeal membranes even when the latter are thoroughly intact and free from lesions. The ratio of the amount of antitoxin in the C.S.F. to that in the blood is generally very low, although it appears to vary consider-

ably according to whether the immunization has been active or passive. Certain theoretical and practical aspects of these findings are discussed.—Alfred Eden.

Shumacker, H. B., Jr., Lamont, A., & Firor, W. M. (1939). **The Reaction of "Tetanus-Sensitive" and "Tetanus-Resistant" Animals to the Injection of Tetanal Toxin into the Spinal Cord.**—*J. Immunol.* **37.** 425–433.

Graded doses of tetanus toxin injected into the motor area of the lumbar part of the spinal cord of 200 dogs, 40 cats, and 15 monkeys produced the same clinical picture in each species except for the thermal response. When fairly large doses of toxin were injected into the cord, dogs invariably showed a terminal high fever, cats did not invariably show high fever, while monkeys had a definitely subnormal temperature. Although the monkey is very sensitive, the dog very resistant, and the cat even more resistant to intravenous, intramuscular, or subcutaneous injections of tetanus toxin, roughly the same amount of toxin per unit of body weight killed the animal when injected directly into the lumbar part of the cord in all three species. The variation in natural resistance in the three species to tetanus toxin injected into the peripheral blood was ascribed to destruction in some unknown manner of toxin in the blood-lymph system, or to the fixation of toxin in tissues insufficiently injured to cause death in the naturally resistant species. —R. O. Muir.

Milner, J. G. (1941). **Allergic Eczema and Cataract.**—*Brit. med. J.* March 8th. 356–357.

Report of a case of anterior cataract, beginning at the age of 26, in a man subject to allergic eczema. A discussion is given of other reported cases of cataract associated with skin diseases, usually neurodermatitis. The lens is developed from surface ectoderm, but is very rarely involved in skin diseases.—R. Allcroft.

Raffel, S., Pait, C. F., & Terry, M. C. (1940). **The Proteins and Antibodies of Serum after Prolonged Dialysis. I. Periodic Removal of Precipitates.**—*J. Immunol.* **39.** 317–335.

Raffel, S., & Terry, M. C. (1940). **The Proteins and Antibodies of Serum after Prolonged Dialysis. II. Dialysis without Periodic Removal of Precipitate. III. Serial Immunization with Quantitative Antibody Estimations.**—*Ibid.* 337–347 and 349–360.

I. Normal and immune rabbit sera were dialysed against distilled water for periods of 28–41 days, and the precipitates were serially removed every few days. These precipitates changed in character, composition, and quantity as dialysis proceeded and at least half of the total precipitate comprised an albumin-like protein. The antibody content of the serial precipitates approximately paralleled their total N levels and the largest precipitates were also found to be richest in antibody per unit mass. Dialysis of the immune sera indicated that the better quality antibody of the sera was associated with the water-soluble globulin. As the multivalence of antibody as a rule increased with progressive immunization, the authors suggest that the specific globulin association of immune body in any particular serum depends upon the immunizing treatment.

II. Similar studies to those reported in I were made with normal and immune sera without periodically removing the precipitate ("continuous dialysis"). The character of the precipitate obtained at the end was comparable with that of the "intermittent dialysis" described in I, but the quantity and composition were different. There was less total precipitate, mainly because of the sedimentation of less albumin-like protein and partly because of less globulin precipitates. Qualitative and quantitative distribution of antibody between dialysed fractions supported the view that the specific globulin association of immune body depends upon the intensity of the immunizing treatment. In the rabbit, multivalent antibody seemed to be associated with the water-soluble globulins. With progressive vaccination an increasingly greater proportion of this type of antibody was found in association with water-soluble globulin and a gradually decreasing proportion in association with the water-soluble fraction.

III. Single samples of serum subjected to prolonged dialysis by both the "intermittent" and "continuous" methods showed that the former led to a greater precipitation of total protein, globulin, and antibody [see I and II]. Samples of sera from a group of rabbits progressively immunized against type 2 pneumococcus gave evidence of changing protein and antibody relationships. The later sera showed progressively a greater increment of water-soluble over total globulin, greater proportions of total antibody in the water-soluble globulin, and increase in multivalence in the antibody.

All the evidence in these papers is considered

to show that the first less avid antibody produced in rabbits is associated with the water-insoluble globulin and that, as immunization proceeds, the increasing amounts of multivalent immune body are composed of water-soluble globulins. The specific globulin association of the antibody produced by this species thus seems to be dependent on the stage at which serum is obtained during immunization.—Alfred Eden.

Howie, J. W., & Cruickshank, J. (1940). **Bacterial Spores as Antigens.**—*J. Path. Bact.* **50.** 235–242.

Tests were made with *Clostridium sporogenes*, *Bacillus cereus*, *B. mesentericus* and with two soil organisms bearing some resemblance to *B. cereus*.

The authors conclude that bacterial spores are antigenic and that spore antigen is separate and distinct from the antigens of the bacilli to which the spores give rise on germination.

Rich, A. R., & Follis, R. H., Jr. (1940). **Studies on the Site of Sensitivity in the Arthus Phenomenon.**—*Johns Hopk. Hosp. Bull.* **66.** 106–120. [Authors' summary copied *verbatim*].

In the Arthus type of hypersensitivity there is vascular sensitivity but the cells of the tissues at large are not themselves sensitized. Tissue death in the Arthus reaction results primarily from impairment of nutrition due to vascular damage and to clogging of the tissue spaces with exudate and haemorrhage.

It has been shown by numerous investigators that if foreign protein is injected one or more times into the cornea of one eye, a subsequent injection after some days leads to a more marked corneal reaction than occurs as a result of the injection of the protein into the opposite, untreated eye. This has been attributed to the development of local hypersensitivity in the treated eye. The present experiments indicate that the more marked reaction in the treated eye is due not to a higher degree of local sensitization of the corneal tissue, but to the increased vascularity which results from the preliminary intracorneal injections, and from which a greater amount of exudate can be derived more promptly.

van den Ende, M. (1940). **Reversed Passive Anaphylaxis in the Guinea-Pig.**—*J. Hyg., Camb.*, **40.** 377–395.

Reversed passive anaphylaxis could not be induced with pure crystalline egg albumen. When purified anti-pneumococcal antibody globulin was used as the sensitizing antigen, anaphylactic shock could be elicited by the intravenous injection of precipitins for the antibody globulin. The phenomenon was more regularly produced in *in vitro* than in *in vivo* experiments. Strips of uterine muscle from virgin g. pigs previously sensitized by intraperitoneal injection of purified anti-pneumococcal antibody were suspended in Locke's solution and subjected to shock-eliciting doses of specific polysaccharide (direct anaphylaxis) or anti-antibody globulin (reversed anaphylaxis).

Reversed passive anaphylaxis, like direct anaphylaxis, is dependent on a cellular mechanism and success depends on the acceptibility of the antibody to the cells of the g. pig's tissue. E. suggests that in order to avoid even small amounts of circulating antigen, which will inhibit the shock, it is necessary to use carefully determined sensitizing doses. With the *in vitro* technique an excess of antigen can easily be avoided.—J. S. Paterson.

DISEASES, GENERAL

Frei, W. (1937). Die Erforschung der Haustierkrankheiten in der Schweiz. **[Research on Animal Diseases in Switzerland].**—*Schweiz. Arch. Tierheilk.* **79.** 503–509.

F. stresses environment, such as general hygiene, climate, etc., as an influence in the spread of disease. He believes that accurate data concerning the geographical distribution and seasonal occurrence of animal disease are highly important. For this purpose he organized a group of workers to study the influence of mountain climate on disease, as well as the occurrence of deficiency diseases, sterility, trichomonad abortion, and streptococcal mastitis.—D. Slavin.

Lovell, R., & Hill, A. B. (1940). **A Study of the Mortality Rates of Calves in 335 Herds in England and Wales (Together with some Limited Observations for Scotland).**—*J. Dairy Res.* **11.** 225–242.

This analysis of mortality rates of calves in England, Wales, and Scotland was made with the assistance of the Central Milk Recording

Societies of England and Wales and affiliated societies, and also from information supplied on 20 other herds in England and 47 herds in Scotland. The authors admit that this is probably not quite representative, because a higher than average standard of husbandry is to be expected in recorded herds. Because of the usual early sale of bull calves, mortality rates of these per live births cannot be compared to those of female calves after the first week of life. It is shown that 5·5% of female calves (693 of 12,544) born in the 335 herds in England and Wales died before the age of six months; of the total births (26,440), 4·4% (1,231) were stillborn; of the total pregnancies (27,970), 5·5% (1,530) terminated in abortion, and the total losses up to six months of age amounted to 14·3%. There was a seasonal incidence of greater mortality in the first half of each year similar to that described for Scotland by JORDAN [(1933). *Vet. J.* **89.** 202]. Losses were slightly greater in the more northern regions and significantly so in Scotland. Several of the tables analyse the mortality rates from various causes in the main agricultural regions adopted by the Ministry of Agriculture and Fisheries. Highest losses were recorded in herds of less than 20 cows, but in general the size of herd was not a factor. The survey suggested that colostrum taken naturally was advantageous, but if withheld neither feeding by suckling, pail feeding whole milk, nor pail feeding diluted milk influenced mortality. Although no reliable figures as to causes of death were collected, *Bacterium coli* infection was probably the most important. Nearly half the deaths of female calves occurred in the first week of life and three-quarters in the first month.—C. V. WATKINS.

STAZZI, P. (1939). Nuove ricerche sulle lesioni specifiche dei genitali delle bovine. **[Specific Lesions of Bovine Genital Organs (Tuberculosis, Brucellosis, Trichomoniasis)].**—*Rep. 13th int. vet. Congr. 1938.* **1.** 589–594. [In Italian: English, French and German summaries].

An account of a few observations on TB., brucellosis, and trichomoniasis in cattle in the Milan area.

ERIKSSON, K. (1940). Aerftlighetsundersökningar over sterilitet hos nötkreatur. **[Genetical Research on Sterility in Cattle].**—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 866–886. Discussion pp. 887–892. [English summary].

This is substantially the same as a paper presented at the last international veterinary congress [*V. B.* **10.** 190]. In the discussion, DANELIUS spoke of ovarian cysts and cervicitis in cows and stated that they are interconnected, as treatment of the one condition often cures the other also. Ovarian cysts are more common in confined cows than in those at grass and the incidence is greater in high yielding cows. GLUD stated that there is an increased production of folliculin from ovarian cysts and that this causes nymphomania. To cure the latter the cysts should be evacuated and a dose of luteinizing hormone given. ERIKSSON in reply referred to ovarian cysts from the genetical aspect and admitted the difficulties of proving the condition to be inherited and of controlling it by genetical measures.—J. E.

HOFLUND, S. (1940). Untersuchungen über Störungen in den Funktionen der Wiederkäuermagen, verursacht durch Schädigungen des N. vagus. **[Chronic Digestive Disturbances in Ruminants Consequent on Injuries to the Vagus Nerve].**—*Svensk VetTidskr.* **45.** Suppl. No. 15. pp. 322. [In German: English summary].

Disturbances of the mechanical functions of the ruminant stomach due to lesions involving the gastric branches of the vagi have been previously described [*V. B.* **6.** 162, and **10.** 854]. In this monograph a detailed account is given of the normal physiological functions of the stomach, supplemented by the results obtained by H. in experiments made on this subject as a prelude to the study of the functional disturbances described.

The main part of the work deals with the experimental production of conditions similar to those found clinically by section of the abdominal branches of the vagi.

Four main types of disturbances are described. (1) Complete stenosis between the reticulum and omasum with atony of the reticulo-rumen sac. This occurs after section of both abdominal roots of the vagi at the cardia. The animals remain normal for 36 hours after operation provided no food is given. After feeding, tympanites develops due to paresis of the stomach, and death is due usually to aspiration of ingesta following vomiting. (2) When all the nerves supplying the omasum and abomasum are sectioned the same conditions as in (1) are produced except that hyper-

activity of the reticulo-rumen sac or atony of the reticulum occurs. The reticulo-rumen sac becomes distended with food, but tympanites does not occur as the sac is active. Passage of food from the reticulum is prevented owing to paresis of the omasum. (3) Stenosis of the pylorus with atony of the reticulum is produced when two or more of the nerves to the abomasum are cut. The abomasum becomes distended and radiologically peristalsis is seen to be reduced or absent. Ulceration of the mucosa frequently occurs. If the omasum is affected, the passage of food from the reticulum may be prevented, and so this in turn becomes distended. (4) Incomplete or recurring pyloric stenosis occurs when the damage done to the abomasal nerves is less extensive. The animal may appear normal for some time and then develop symptoms which may be fatal, or recovery may occur slowly. Sometimes the only results are transient disturbances of digestion.

Many clinical cases were investigated and autopsied. The first clinical signs are depression of the pulse and temperature. In all types the general symptoms are similar ; auscultation of the stomach is an indispensable aid to diagnosis. When the reticulo-rumen sac becomes distended with food and retains its activity, the contents become more and more liquid owing to the salivary flow and water drinking, while the onward passage is prevented either at the pylorus or at the reticulo-omasal junction ; consequently the stomach sounds of this sac become less audible. The decreased volume of urine and the increased viscosity of the blood indicates that absorption is depressed. In pyloric stenosis the omasum sounds become " rushing and gurgling " in contrast to the usual " rustle " heard when the contents are more solid. Rumination usually ceases, but vomiting may occur. The faeces become firmer and the quantity diminished, but periodic diarrhoea may occur. The animal eventually dies from starvation.

P.M. examination reveals distention of the abomasum and omasum with pyloric stenosis, whereas these compartments are empty when the stenosis occurs at the higher level, in which case the anterior sac is distended. The intestines are usually nearly empty. The common lesion involving the vagal supply to the stomach is chronic traumatic peritonitis in the region of the reticulum including often abscess formation. Other conditions which interfere with the vagi are enlarged posterior mediastinal lymph nodes due to TB., which produce pressure on the thoracic vagi or involve them through secondary infection involving the mediastinum. Diaphragmatic hernia and lymphadenosis also may produce similar results. Histological study of the gastric branches of the vagi in some clinical cases revealed degenerative changes, but it must be mentioned that this was not performed in all cases; and in one at least no such changes were found.

[The most conclusive test as to whether the vagi were functional or not would have been to anaesthetize the animal before slaughter and to stimulate the vagi electrically, observing the motor effect upon the stomach. The effect of acute nerve section is divided by McSwiney (1931) into two phases, *viz*, (1) the initial phase, which is due to shock and in which inhibition and paresis occurs, and (2) a return to nearly normal function ; the only permanent symptom in the animals with a simple stomach is a delayed initial emptying time. The intrinsic nerve supply of the stomach can assume control and maintain function satisfactorily, although central control is severed. In the cases recorded here the disturbances due to experimental section appeared to be due to the first phase ; owing to the nature of the food and the complexity of the stomach of ruminants this was often fatal. Chronic lesions involving the vagi might be expected to produce the second phase. Consequently the clinical cases are of greater interest in studying the nervous control of the ruminant stomach, and it is a pity that the crucial test of electrical stimulation was not applied, as some doubt must remain as to whether the vagi were functional or not. The work, however, is of great interest from all aspects of ruminant gastric physiology.]

—A. T. Phillipson.

I. McNutt, S. H. (1940). **A Preliminary Report on an Infectious Encephalomyelitis of Cattle.**—*Vet. Med.* **35.** 228–230.

II. McNutt, S H , & Waller, E. F. (1940). **Sporadic Bovine Encephalomyelitis (Buss Disease).**—*Cornell Vet.* **30.** 437–448.

I. The author describes a disease of young cattle which is said closely to resemble listerella infection. It is primarily an infectious encephalitis and meningitis. Attempts to isolate listerella from cases of the disease have failed in every instance, and since no cause has so far been discovered, the disease has been termed " Buss encephalomyelitis " to mark the source

from which the first experimental material was obtained. A brief account is given of the course of the disease in four herds. Infective material from cases of the disease can readily transmit infection to g. pigs, in which it gives rise to a disease localized according to the route of inoculation. In inoculation experiments with calves the incubation period varied from 7–27 days. The first symptom is a rise in temperature to 104°–107°F., the temperature remaining high until death or recovery. The major nervous symptom is cerebral depression, the disease resembling bovine malignant catarrh in this respect. The course of the disease is from five days to two weeks, and about 60% of the affected animals die. At autopsy the lesions of the brain, cord, liver, and kidneys are almost identical with those seen in bovine malignant catarrh. In the later stages a serofibrinous peritonitis is found, which serves to distinguish this disease from listerella infection. There is no inflammation of mucous membranes, which differentiates " Buss disease " from malignant catarrh. The author emphasizes that while " Buss encephalomyelitis " appears to be a hitherto undescribed disease, a final decision must await more complete investigation.

II. A further account of " Buss encephalomyelitis " in which the authors describe the histological appearance of the lesions found at autopsy. It has been found that in calves the subcutaneous route of inoculation of infective material is fully as satisfactory as the intracranial. Subcutaneous or intramuscular inoculations with infective material cause a localized reaction, which histologically is characterized by a cellular infiltration composed chiefly of monocytes, some oedema, and a pale staining of the muscle fibres. When calves are injected on the side of the neck, the prescapular and other lymph nodes in this region become enlarged. The spread of the " virus " in the body, apparently *via* the lymph stream, is slow, and after a prolonged illness most of the lymph nodes become moderately enlarged. There are no macroscopic lesions of the brain or cord. Microscopic lesions consist of a perivascular cuffing with monocytes, focal areas of monocytic infiltration with some liquefactive necrosis, and cell infiltration and oedema of parts of the meninges. The " virus " also seems to affect the nasal passages since these are congested and contain catarrhal exudates. After the disease has progressed for some days, a serofibrinous pleurisy and peritonitis develop.

One attack of the disease apparently gives some protection against further exposures. Serum from recovered calves does not protect susceptible animals, although there is some evidence that " immune " serum does delay the onset and reduce the severity of the symptoms and lesions. Inoculation of killed infective material does not produce an immunity.

The causal agent of the disease has not been identified in spite of intensive efforts. Details are given of experimental work with g. pigs, in which the main lesions are peritonitis and pleurisy, rarely encephalitis. The " virus " of the disease has been propagated on chick embryos for over 60 days in serial passage. It appears that the " virus " is not filtrable through Berkefeld N filters.—N. J. Scorgie.

Blakemore, F., & Bosworth, T. J. (1941). **The Occurrence of Jaagziekte in England.**—*Vet. Rec.* **53.** 35–37.

This article records the occurrence of " jaagsiekte " in a flock of sheep in Norfolk. The sheep in this flock had been collected from various sources, but the losses from " jaagsiekte " were limited to a batch of 100 crossbred ewes brought from Scotland the previous year. Several deaths occurred, but the disease showed no tendency to spread to the same extent as does the apparently identical disease in Iceland. Two of the affected sheep were examined during life. The symptoms were similar to those described in the Icelandic disease, the most characteristic being the tendency for large amounts of clear serous fluid to run from the nostrils when the head was inclined. The characteristic P.M. lesions were confined to the lungs and smaller bronchi. Histologically, the changes were identified with those described by Cowdry (1925) in the South African disease and by Dungal *et al.* [*V. B.* **8.** 651.] in Icelandic pneumonia. No lungworms were present, a finding which supports the view that the typical proliferative changes in the lung epithelium can occur in the absence of parasites. The authors conclude that further information regarding the occurrence of the disease in England is important, especially in view of the evidence brought forward by M'Fadyean [*V. B.* **9.** 104.] which suggests that the disease has existed unrecognized here for many years.—N. J. Scorgie.

Gildow, E. M., Williams, J. K., & Lampman, C. E. (1940). **The Transmission of and Resistance to Fowl Paralysis (Lymphomatosis).**—*Bull. Idaho agric. Exp. Sta.* No. 235. pp. 22.

After a brief review of fowl paralysis investigations the authors suggest that the aetiology of this complex in chickens has not yet been solved. They record losses of up to 75% in pullet stock in the U.S.A. In Idaho, cases were first reported in 1930. After a rapid spread there has been a decline of cases since 1935, stated to be due to resistance in a few of the chief breeding flocks and to " a better understanding of the disease."

The authors record a four-year study of transmission of the disease by contact, in groups of birds from affected, healthy (susceptible), and resistant flocks reared together from the time of hatching or after 2, 4, and 6 weeks of brooding (no contact until 6–12 weeks of age in the fourth year). Some 2,500 chicks were used and the experimental trial each year is detailed. Diagnosis was made upon symptoms and macroscopic lesions. The incidence of disease in the susceptible chicks averaged over 40%, while there was a decreasing incidence over three years of 31, 20, and 7·6% in the affected flocks, in which a natural resistance was being built up. Susceptible birds up to eight weeks of age in the first three years' experiments developed the disease, probably by contact with intermediate agents soiled by affected birds. In the fourth year, susceptible chicks of six weeks of age were found to be as resistant to contact (4% incidence) as those of 12 weeks (8%), compared with 41·8% at hatching.

In affected flocks hen progeny were found to be more resistant to infection than pullet progeny, the incidence in pullet progeny being approximately 35% greater than in hen progeny. The gradual decline from an average of 21·4% to nil of paralysis mortality in average, high, and low mortality stock during a six-year period is tabulated ; this emphasizes what may be done to assist the development of natural resistance. The theory that the paralysis is inherited is discounted, but a resistance or susceptibility to the disease is definitely inherited, although the exact type of inheritance has not yet been analysed.

—C. V. Watkins.

Moore, E. N. (1940). **Relationship of Ruptured Yolk to Fowl Paralysis.**—*J. Amer. vet. med. Ass.* **96.** 727–732.

The association of a variety of bacteria with ruptured yolk in hens is discussed. The presence of egg yolk free in the abdominal cavity was believed to cause auto-intoxication and death, or to produce sufficient mechanical pressure on the organs to result in permanent physiological disturbance, but M.'s experiments showed that yolks or portions of yolks may be introduced into the peritoneal cavity of fowls, without causing clinical symptoms or death.

Observations were made on five pens each of 100 laying fowls. The average mortality was 20%, of which fowl paralysis, alone or combined with ruptured yolk, accounted for 11%. Ruptured yolk alone was the cause of death in less than 2%.

From the results of the statistical analysis of the pathological details of the fowls which were necropsied, M. considers that ruptured yolk does not represent a separate disease entity.

—S. G. Iyer.

Schirrmeister, E. (1939). Literaturübersicht und eigene Beobachtungen über die Marek'sche Geflügellähme. [**Review of the Literature and Original Observations on Fowl Paralysis**].—*Arch. Geflügel.* **13.** 258–274 and 300–313. [Abst. from author's English summary].

P.M. observations on chicks 9–16 days old showed that infection with fowl paralysis takes place at an early age. The disease remains dormant, clinical symptoms appearing at the age of six months and becoming more pronounced in birds 6–12 months old. Older birds seldom appear to be affected. Highly bred and inbred birds were particularly susceptible. Cockerels proved to be as susceptible as pullets, and are therefore capable of introducing the disease into poultry farms. Most cases were observed in autumn and spring, and occurred mainly in breeding farms. Cases among turkeys were also diagnosed.

Miller, N. J. (1940). **Diseases Incident to the Fattening of Lambs.**—*J. Amer. vet. med. Ass.* **96.** 24–29.

M. describes the most common diseases which affect lambs in Colorado after they have been removed from the range and are being fattened for the market. He divides them into two groups, one consisting of infections contracted during the journey to the feed pen owing to fatigue and exposure, and the other of conditions due to faulty feeding. In the first group are paratyphoid, haemorrhagic septicaemia, contagious ecthyma or soremouth, and non-specific pneumonia, all of which M. considers could be prevented if the animals were treated with greater care during their

journey, and if the practice of a 12–24 hour fast before weighing were discontinued.

Among the diseases due to faulty feeding he includes coccidiosis, as the sudden change from natural grass feed on the open range to concentrated diet in the pens is a predisposing factor. Another cause of heavy mortality is overeating; this occurs in the larger lambs which are fed concentrates to the greatest possible extent in order to get them fat before they have outgrown the lamb size and so avoid penalization for having overweight lambs on the market; most of the affected animals show cerebral symptoms, lying with the head thrown back and keeping up constant movements with the legs, with scours just before death. The only method of prevention is care with the feeding; the margin between the fattening ration and the killing ration is slight and lambs should be watched carefully for symptoms.

Other conditions mentioned are indigestion, diarrhoea, and internal and external parasitism.

GRASHUIS, J. (1939). Ein tweetal ziektegevallen bij varkens. [**Two Pig Diseases (Polyarthritis in Swine Erysipelas: Sarcosporidiosis with Haemorrhagic Diathesis)**].—*Tijdschr. Diergeneesk.* **66.** 281–288.

Clinical case records of chronic polyarthritis as a complication of swine erysipelas in two young pigs, and of dysentery with wasting of the muscles of the hindquarters due to heavy sarcosporidial invasion in two other pigs. It is suggested that in the latter affection the pigs had an avitaminosis C.—L. TOBBACK.

WHITLOCK, S. C. (1939). **The Prevalence of Disease and Parasites in Whitetail Deer.**—*Trans. 4th N. Amer. Wildlife Conf. 1939.* pp. 244–249. Washington, D.C.: American Wildlife Institute.

W. gave notes on disease incidence among deer in the state of Michigan, and particularly in a captive herd at the Cusino Wildlife Experiment Station. Mortality was low, the greatest danger being shortage of suitable food in the winter yards. Lungworm infestation, and pneumonia associated with *Streptococcus pyogenes*, *Staphylococcus albus*, and *Staph. aureus*, appeared to contribute to the death of some of the animals, but starvation was the principal factor. Five species of lungworm were observed, the common one being *Protostrongylus coburni*. W. expressed the belief that an intermediate host is necessary for this species, since only one case was recorded of infection in the yards, where exposure to direct infection was constant.

The liver fluke, *Fascioloides magna*, was present in about 25% of the animals. *Cysticercus tenuicollis*, intestinal nematodes, and a species of *Setaria* occurred sometimes. None of these parasites appeared to be pathogenic.

W. found large numbers of the larvae to *Cephenomyia phobifer* at P.M. examination in the nasal passages of healthy deer, and believed them to be harmless, apart from a capacity to produce inflammation of the upper nasal cavity. 25% of the animals had these larvae.

The chief ectoparasite encountered was the biting louse, *Trichodectes tibialis*. Biting flies and mosquitoes caused a falling-off in condition during part of the summer, but there was no evidence of disease transmission by them.

There was no definite correlation between the occurrence of sickle-shaped red cells in the blood and disease incidence.—E. S.

KLEMOLA, V. M. (1940). Om fruktsamhet och orsaker till valpdödlighet hos silverräv i Finland. [**Fertility of Silver Foxes and Causes of Losses in Cubs in Finland**].—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 949–968. [In Swedish: German summary].

A report of the breeding and cub mortality records on fox farms in Finland, compiled from figures supplied from 160 farms containing 4,000 breeding vixens. In one season 12,880 cubs were born, 10,815 of which survived their first four months, making a mortality rate in the young litters of 15·6%.

In Finland the mating season extends from the last week in January to the first week in April, the vast majority of matings taking place in February. In recent years dog foxes have been mated with two or three vixens in the season in order to make the best use of the breeding stock. The gestation period is 51–53 days.

It has been found that the best farming results are achieved when the litter size is 5–7 cubs, losses being proportionately greater with smaller or larger litters. On some small, badly managed farms there is much infertility in the vixens.

A disease similar to canine distemper (*valpsjuka*) is the most important contagious disease: it occurred during one winter in a chronic form and left many vixens sterile. Canine distemper antiserum and prontosil are said to have given good results. Paratyphoid

occurs and is controlled by a polyvalent vaccine. Another disease has made its appearance, in which the cubs have hydrocephalus, oedema, and haemorrhages under the skin. The cause has not been determined.

The paper contains many useful tables and comparative data from Swedish and German sources.—J. E.

SMITH, S. E., & HODSON, A. Z. (1941). **The Composition of Vesical Calculi of Fur Animals.**—*Cornell Vet.* **31.** 30–34.

Vesical calculi from 11 mink, two silver foxes, and one raccoon were obtained for analysis by standard methods. The exact dietary histories were unknown. One of the fox calculi was of undetermined organic composition, and one from a mink appeared to consist of calcium and magnesium phosphate only. The remaining 12 calculi were all composed of magnesium ammonium phosphate, apparently in association with other salts of magnesium phosphate. Quantitative analysis of six of the calculi indicated a remarkable constancy of composition, *viz*, 13·0–15·7% Mg, 19·1–20·0% P, 4·7–5·8% NH_3, and nil (four cases) to 0·9% Ca. One fox calculus weighed 68 g., but the remainder varied in size from that of a pea to that of a hazel nut. None had an observable nucleus or evidence of lamination.—A. N. W.

LOVE, W. G. (1940). **Some Diseases of the Eye of Animals. III. Periodic Ophthalmia.**—*J. Amer. vet. med. Ass.* **97.** 312–319.

A general account of the aetiology, symptoms and treatment of periodic ophthalmia in horses. No new facts are brought to light.— J. A. N.

MCDOWALL, R. J. S. (1940). **The Circulation in Relation to Shock.**—*Brit. med. J.* June 8th. 919–924.

Shock is a clinical state which may be produced by several processes which are initially quite different and which may act separately or in conjunction. A vicious cycle may be set up terminating in death. The possible causes, given in order of importance, are (1) haemorrhage (obvious or concealed), (2) toxins (local or general), (3) excessive vasoconstriction, (4) reflex vasodilatation, (5) shock following excitement, etc., and (6) central exhaustion and injury with CO_2 loss. These causes require different treatment.

Dealing with inhibition of the vasomotor mechanism the author mentions that a profound fall of blood pressure may be produced in animals by mechanical stimulation, but cats vary greatly in this respect being particularly sensitive to such stimuli in the spring, when the sympathetic is most active, and also when they are in a certain depth of anaesthesia. The trauma required to produce shock may be nothing more than a repeated tapping of the tibia or muscles.

In cases of shock produced by stimulation of afferent nerves there may be stimulation or inhibition of the sympathetic system. Both types would be benefitted by anaesthesia, but because of the danger of giving anaesthetics in toxic shock they are not given as a routine but only when really necessary. If the nervous factor is not a contributing factor then all anaesthetics and even morphine should be avoided since they reduce the normal compensatory mechanism to haemorrhage and capillary dilatation.—H. V. HUGHES.

—. (1941). **Thrombocytopen.**—*Lancet.* **240.** 356.

Thrombocytopenic purpura is a well-established clinical syndrome in which the characteristic features are purpura or profuse haemorrhage from mucous membranes, moderate anaemia, a persistently low platelet count, and erythroblastic and megakaryocytic hyperplasia of the bone marrow. In explanation of this syndrome it has been suggested that the spleen produces some substance toxic to platelets. TROLAND and LEE (1938) have extracted from the spleens of patients with thrombocytopenic purpura a factor which when injected into rabbits, a cat, a dog, and a monkey, caused a reduction in the number of blood platelets. They named this factor " thrombocytopen ". Repetition of the work by others gave partially confirmatory results, but the dose and the time needed to produce the effect differed considerably.

It is pointed out that " thrombocytopen " is still a name for an idea, but since it is the only idea offering a reasonable explanation of this special type of purpura it is worth investigating. —R. ALLCROFT.

PODYAPOL'SKAYA, V. P., & DEDOVA, N. P. (1937). O vzaimodeĭstvii mezhdu askaridnoĭ invazieĭ i bakterial'noĭ infektsieĭ v eksperimental'nykh usloviyakh. **[The Interrelation between Infestation by Ascarids and Bacterial Infections in Experimental Conditions].**—*Papers on Helminthology, Commemorating 30 Year Jubilee of Prof. K. I. Skryabin.* pp. 491–496. Moscow: Lenin Acad. Agric. Sci.

The authors conclude, from experiments carried out on mice, that infestation with *Ascaris suum* and *A. lumbricoides* hastens and intensifies the development of mouse typhoid due to *Salmonella typhi-murium*.

SCHLOTTHAUER, C. F. (1940). **Neoplasms in the Mammary Gland in Dogs, Their Pathology and Surgical Treatment.**—*J. Amer. vet. med. Ass.* **96.** 632–640.

Twenty-two cases of canine mammary tumour are described under two headings, *viz*, simple neoplasms, in the sense that they consisted of only one neoplastic element [though one was diagnosed as an inflammatory mass and another as an adenofibroma], and mixed tumours, in which there was more than one. The simple tumours are dealt with individually, while the others are considered as a group. Since all of the mixed tumours had an active epithelial component, it is considered advisable to classify such growths as carcinomas and to grade them according to Broder's method.

To develop a standardized procedure for surgical treatment, S. investigated the lymphatic drainage of the mammae in lactating bitches. His findings are figured in a sketch. Lymph from the first three pairs of glands, he finds, always drains into the axillary lymph nodes, while that from the last two goes to the inguinal nodes. In addition to independent channels from each gland to its regional node, lymphatics from the third pair pass to the second and from the fourth pass to the fifth. No lymphatic channels were found to penetrate the thoracic or abdominal walls, nor were there anastomoses across the mid-line. Though it was not demonstrated, it is thought probable that mammary lymphatics communicate directly with the blood vascular system.

On these findings are based the rules which S. gives for surgical treatment of mammary tumours.—J. W. WHITTICK.

STEWART, F. W., COLEY, B. L., & FARROW, J. H. (1938). **Malignant Giant Cell Tumour of Bone.**—*Amer. J. Path.* **14.** 515–535.

A detailed review is given of the recorded cases of malignant giant-cell tumour of bone in man, with particular reference to histogenesis and distinction from osteogenic sarcoma. Six further cases are recorded, and the conclusion is reached that the term "malignant giant-cell tumour" should be retained until more is known of the malignant evolution of this tumour from relatively benign giant-cell tumour of bone.—E. G. WHITE.

PURDY, W. J. (1938). **Tumour Structure and Tumour Problems.**—*J. R. micr. Soc.* **58.** 171–184.

This is a general account, illustrated by references to a variety of spontaneous and experimentally produced tumours, of the part played by microscopy in the elucidation of the cancer problem. Illustrations are included of fowl tumours, lung metastases of a uterine leio-myo-sarcoma in a rabbit, and a spindle-celled sarcoma from the skin of a dog.

P. stressed the importance of the microscopic study of cancer cells and of Barnard's technique for the ultra-violet micrography of virus particles.—E. G. WHITE.

SPIEGEL-ADOLF, M. (1939). **Studies on Melanins. II. Ultraspectrography of Photosynthetic and Tumor Melanins.**—*Fundam. radiol.* (*Berl.*). **5.** 36–42. [In English: French and German summaries]. [Abst. from German summary].

Photosynthetic and tumour melanins and sepia have been studied by ultraspectrographical methods. The differences observed in optical absorption of tyrosine and tryptophane melanins are only slightly decreased by an increase of the alkalinity. Irradiated tyrosine solutions show a positive Hopkins reaction, indicating the presence of indole or indole derivatives. Optical absorption of sepia is markedly higher than that of human tumour melanins, which ranges between the former and the photosynthetic melanins. Trypsin digestion of sepia brings its optical absorption within the range of similarly treated tumour melanins.

Tumour melanins of similar origin and chemical composition show similar absorption spectra in short-wave light. Melanins from mice melanomas show an optical absorption markedly different from melanins from human melanomas, and practically identical with that of photosynthetic tyrosine melanin.

KIDD, J. G., & ROUS, P. (1940). **Cancers Deriving from the Virus Papillomas of Wild Rabbits under Natural Conditions.**—*J. exp. Med.* **71.** 469–494.

This paper deals with 20 cancers which originated in naturally occurring papillomas of cottontails. All animals were adults and both sexes were affected. All growths were typical carcinomas. They grew progressively, invaded and destroyed, and frequently metastasized.

They could be transplanted in a leg muscle on their own hosts but not on other individuals. Cancerous changes often supervene in virus papillomas induced in domestic rabbits and similar results were observed with wild jack rabbits (*Lepus californicus*) and snowshoe rabbits (*L. americanus*) although it was not possible to maintain these animals much longer than 3–4 months in captivity. It was not possible to recover the virus from the cancers.

The authors suggest that the virus must be added to the numerous primary causes of cancer which are known to be effective under natural conditions. Further they think that the cancers result from variation, but admit that the evidence is slight. The more frequent appearance of cancers in unnatural hosts, *viz*, the domestic, jack and snowshoe rabbits, suggests a qualitative alteration of the virus analagous to the change of the virus of variola to vaccinia.—J. S. PATERSON.

KIDD, J. G. (1940). **A Distinctive Substance Associated with the Brown-Pearce Rabbit Carcinoma. I. Presence and Specificity of the Substance as Determined by Serum Reactions. II. Properties of the Substance: Discussion.**—*J. exp. Med.* **71.** 335–350 and 351–371.

I. A specific substance was regularly present in saline extracts of the Brown-Pearce rabbit carcinoma which was capable of fixing complement specifically when mixed with the sera of some rabbits bearing the tumour, or in which it had recently retrogressed. The substance was not present in saline extracts of normal tissues, virus papillomas or uterine cancers of rabbits, nor was it present in tissues infected with certain viruses (vaccinia, virus III, or fibroma virus). There was no c.f. with sera from normal rabbits, nor from those immune to a variety of infectious diseases such as syphilis, vaccinia, fibromatosis, and virus III, and to conditions such as uterine cancers or virus-induced papillomas.

II. The specific substance or antigen of the Brown-Pearce tumour is similar in type to the antigen of the virus papilloma. It can be differentiated from the Wassermann, Forssman and organ- and species-specific tissue haptens since it is not effective after alcoholic extraction. It was inactivated by heating to 65°C. for 30 min. and by treatment with acid (pH 4·5 or under) or alkali (pH 11·5 or over). Filtration showed that the antigen has a large and nearly uniform particle size (348 mμ to 383 mμ), and it was thrown down completely by spinning at 20,000 r.p.m. for one hour. It is thus sharply differentiated from the "soluble antigens". Extracts containing the active substance, however, have failed to give rise to lesions upon injection into normal or tarred rabbits.

K. considers that his experiments justify the assumption that this antigen is not an extraneous virus or "pleuro-pneumonia-like" organism "riding along with the transplanted tumour", nor is it a component of normal rabbit tissues, but whether or not the substance becomes manifest during the course of transplantation, and whether it plays a part of any significance in the activities of the tumour cells, cannot yet be decided. Much further investigation of many other tumours will be required to decide whether the presence of a distinctive antigen in the Brown-Pearce tumour is unique or characteristic of tumours generally.—J. S. P.

HYDE, R. R. (1939). **The Pathogenesis of Infectious Myxomatosis (Sanarelli) as Modified by Certain Immunizing Agents.**—*Amer. J. Hyg.* Sect. B. **30.** 37–46.

Intradermal injection of heat-inactivated tissue virus (60°C. for 30 min.) into domestic rabbits gave some degree of protection against the otherwise fatal myxoma virus. Protected rabbits given a second injection showed an allergic local reaction and less severe symptoms than "clean" ones, the lesions were more circumscribed, and death was delayed or prevented. The immune response was increased by the addition to the heat-inactivated virus of viable type 3 pneumococci or *Pasteurella lepiseptica*, but not by the addition of vaccinia or fresh tumour tissue from rats (Walker carcinoma No. 256). Young rabbits seemed to respond better than older ones. The above accessory factors added to the vaccine were chosen partly because they produce a local inflammatory reaction when injected intradermally in the skin of rabbits.—E. G. WHITE.

PARKER, R. F. (1940). **Studies of the Infectious Unit of Myxoma.**—*J. exp. Med.* **71.** 439–444.

The infectious unit is defined as the "least amount of virus capable of giving rise to infection under suitable conditions". Experimental and statistical evidence is produced to show that the virus of infectious myxoma of rabbits behaves on inoculation into the skin as if infection were initiated by a single virus particle.—J. S. PATERSON.

NUTRITION IN RELATION TO DISEASE

Willman, J. P., McCay, C. M., Morrison, F. B., & Maynard, L. A. (1940). **The Relation of Feeding and Management to the Cause of the Stiff-Lamb Disease.**—*Proc. 33rd ann. Meet. Amer. Soc. Anim. Prod. 1940.* pp. 185–192.

" Stiff-lamb disease " [see *V. B.* **5.** 646, and **10.** 109 and 188.] affects animals 3–5 weeks old, and almost invariably it is among the best lambs in the flock that cases appear. It is most prevalent in April and May, although the annual incidence in a flock varies considerably. The most severely affected animals may become unable to rise and either die or are destroyed, while many lambs which survive an attack fail to do well subsequently. The extent and distribution of the muscular lesions vary.

Experiments have been conducted over the past 11 years in order to elucidate the significance of feeding and management in the production of the condition. The authors are satisfied that the disease is of nutritional origin, and that the condition is not present at birth. Close confinement of the pregnant ewes is not thought to be an important factor, but the incidence seems to be high in the progeny of ewes which are liberally fed. The feeding of maize silage or of bone-meal or sodium phosphate to the ewes failed to prevent the condition, as did drenching the young lambs with the equivalent of 60–180 mg. ascorbic acid per week. The incidence appeared to be markedly reduced in a controlled experiment in which unextracted wheat-germ meal was added to the basal maternal diet of oats, barley, cull beans, and lucerne hay. Of 27 lambs born to ewes receiving the unsupplemented ration, 14 exhibited typical symptoms of the disease, whereas among 28 lambs from the wheat-germ group, one only was affected.

Limited chemical studies of the milk and the lambs' blood have so far not thrown any light upon the nature of the condition.—A. N. W.

Wurst, R. (1940). Untersuchungen über den Zusammenhang zwischen Ferkelsterben und intensiven Fütterungsmethoden. **[Research on the Connexion Between Piglet Mortality and Intensive Feeding].**—*Wien. tierärztl. Mschr.* **27.** 323–333.

An obscure disorder of young pigs is described commencing at about the age of three weeks, associated with discoloration of the skin, diarrhoea sometimes alternating with constipation, and pronounced liver dystrophy without noteworthy changes in other organs. The proportion of pigs dying or killed as runts before ten weeks of age was as high as 55% in 1934, 49% in 1935, and 43% in 1936. Apart from the sow's milk, the piglets had access to the sow's high protein ration of 80% barley meal, 11% fish meal, 8% dried yeast, and 1% chalk. After restriction of the fish in the ration available to the young pigs to 3% for the first ten weeks of life, total losses were kept below 20% for the ensuing three years. After 12 weeks a level of fish meal up to 12% was well tolerated.

W. regards the disorder as non-infectious and advances a somewhat vague theory of food poisoning, predicating development of an allergic condition through the alimentary tract.

—H. H. Green.

Duncan, C. W., Huffman, C. F., & Tobin, H. A. (1939). **A Chemical Study of Ketosis in a Dairy Herd.**—*J. Amer. vet. med. Ass.* **95.** 690–700.

An intensive study was made of acetonaemia in a pure-bred herd of nine Jersey cattle in which the disease had become so malignant that practically every animal was affected. The ketone bodies in the blood averaged 23·1 mg. per 100 c.c. and in the urine 154·5 mg. per 100 c.c. The blood Ca, Mg and Cl were normal. Four weeks after changing the herd on to a better and properly balanced diet a great improvement was noted, the ketone bodies in the blood being reduced to 2·9 mg. and in the urine to 42·9 mg. per 100 c.c. Acidosis was not present at any time nor could a relationship between blood ketone and the CO_2-combining capacity of the blood be demonstrated. It is suggested that the intermediate products of cellulose fermentation play an important role in ruminant digestion.—J. A. Nicholson.

McCollum, E. V. (1941). **Diet in Relation to Dental Caries.**—*Nature, Lond.* **147.** 104–108.

In considering the causes of dental caries, M. discusses the developmental defects in the enamel which predispose teeth to decay. Nutritional factors of considerable importance are (a) vitamin A deficiency, and (b) vitamin D deficiency with a disturbed Ca and P metabolism as is found in rickets. Mellanby showed that the incidence of caries in school children was greatly reduced by feeding vitamin D supplements, while McBeath

correlated the seasonal incidence in children with the amount of ultra-violet light at different periods of the year. The mode of action of vitamin D is unknown, but it may have some effect upon certain immunological mechanisms affecting growth of the mouth flora.

The effect of sugar consumption is discussed, and sugar, as opposed to starchy foods, seems to have a definitely deleterious effect upon teeth. Arrested states of caries have been found in diabetic patients subsisting on a low carbohydrate, high fat diet, but the mode of action of the fat is unknown. The odontoblastic membrane appears to be peculiarly susceptible to injury in a vitamin C deficient state. The flora of the mouth depends upon conditions other than the character of the food. Malnutrition in dogs due either to nicotinic acid or vitamin A deficiency has an adverse influence upon the health of the teeth, although caries can be prevented by a strictly carnivorous diet. The importance of raw foods in providing exercise for the teeth is emphasized and M. considers that the meal of every human being should end with raw fruit or raw vegetables because of the exercise to the teeth and the detergent action of such foods upon the surface of the enamel.—ALFRED EDEN.

SCHLOTTHAUER, C. F., & BERRYMAN, G. (1941). **Canine Hysteria: Its Relation to Dietary Protein.**—*J. Amer. vet. med. Ass.* **98.** 33–35.

The authors were unable to confirm the observations of ARNOLD and ELVEHJEM [*V. B.* **10.** 286.] that hysteria could be induced in dogs by feeding them on a diet containing heated protein. Eight young dogs were given autoclaved diets over periods of 30–80 days; although anorexia developed in most of them, there was no evidence of hysteria or of any other nervous disturbance. The anorexia responded to intramuscular injections of vitamin B_1 hydrochloride.—ALASTAIR N. WORDEN.

FREDERICK, L. D., & ROBINSON, H. E. (1941). **Canine Nutritional Deficiency Diseases.**—*J. Amer. vet. med. Ass.* **98.** 288–294.

A review article which includes illustrated notes describing the various vitamin deficiencies which have been produced in dogs. It is stated that there are estimated to be 15 million dogs in the U.S.A. and Canada.—A. N. WORDEN.

WILCKE, H. L., & HAMMOND, J. C. (1940). **Feathering, Growth, Feed Consumption, and Rachitogenesis in Chicks as Influenced by the Kind of Grain in the Diet.**—*J. agric. Res.* **61.** 369–380.

Groups each containing 50 day-old Single-Comb White Leghorn chicks were fed upon diets in which either oats, barley, wheat, or maize formed the principal constituent, and which were supplemented by dried buttermilk, ground limestone, tricalcium phosphate, sodium chloride 1% and cod liver oil 1%. Further groups received diets containing 20% of oat hulls, hulled oats, or ground whole oats as supplements to the other cereal constituents. In all cases the diets contained approximately 16·6% protein, 0·75% Ca, and 0·54% P. Although there did not appear to be any significant differences between the relative efficiency of utilization of the diets in respect of unit gain in weight, the oat diet produced superior absolute gains to the barley and wheat diets, and those in turn were superior to the maize diet. The quality of feathering also was best in the oat-fed chicks and was by far the worst in the maize group. The addition of the three oat products to the maize diet improved both rate of growth and quality of feathering in each case, and the wheat diet was improved by the addition of 20% oat hulls, despite the common supposition that chicks do not thrive as well on diets containing large amounts of fibre.

There was no evidence that any of the four cereals employed possessed rachitogenic properties.—ALASTAIR N. WORDEN.

WARKANY, J., & NELSON, R. C. (1940). **Appearance of Skeletal Abnormalities in the Offspring of Rats Reared on a Deficient Diet.**—*Science.* **92.** 383–384.

Female rats which were reared on a STEENBOCK and BLACK (1925) rachitogenic diet, were retarded in growth and development, but developed regular oestrous cycles at 4–5 months and mated about a month later. Of a total of 164 young born to 18 such females, 57 presented multiple congenital abnormalities, including abnormally short mandibles, deformed extremities, fusion of the ribs and of the sternal centres of ossification, and short tails. Among 510 offspring born to females of the same strain reared on normal diets, only two showed congenital abnormalities.—ALASTAIR N. WORDEN.

LINDER, G. C. (1940). **The Effect of Rickets and of Ergosterol on the Brain and Liver Calcium of Young Rats.**—*Biochem. J.* **34.** 1574–1579.

The mean concentration of Ca in the brain and the liver of normal white rats was found

to be 4·7 mg. and 3·8 mg. respectively per 100 g. fresh tissue. Young animals (4–6 weeks) of the same strain were provided with a high Ca, low P diet, and within 28–56 days revealed evidence of advanced active rickets, with low serum inorganic P and marked epiphyseal changes. In these rats the liver Ca remained normal while the brain Ca rose to a mean of 5·3 mg. per 100 g. The brain and liver Ca were both increased in acute ergosterol poisoning, but part of the increase in liver Ca is attributed to the diminished food intake, since some increase occurred in paired-fed controls.

[It is stated in the author's summary that the brain Ca was decreased in the animals in which rickets had been induced by feeding a high Ca, low P diet. This statement is not in accordance with those made earlier in the text or with the recorded experimental observations and appears to be a slip.]—A. N. Worden.

Bisschop, J. H. R., Malan, A. I., Steyn, H. P., & Laurence, G. B. (1939). **On the Feeding of a Phosphorus Supplement to Mother-Reared Calves prior to Weaning, under Open Range Conditions in Bechuanaland.**—*Onderstepoort J. vet. Sci.* **13.** 321–343.

The object of the experiment was to determine whether, during the first nine months of life, calves of bone-meal-fed mothers which run under open range conditions will grow and develop more satisfactorily when supplied with a phosphorus supplement. The experimental animals consisted of $\frac{7}{8}$ bred Red Poll calves from $\frac{3}{4}$ bred Red Poll cows getting a bone-meal supplement. It was found that bone-meal-fed cows supplied their calves with sufficient milk for normal development up to weaning age. Such calves may be functionally subnormal as indicated by low inorganic phosphorus in their blood. The deficiency can be remedied by giving phosphates prior to weaning, but this is unnecessary if they are given from weaning onwards. The critical point is not reached prior to weaning as it is in calves of cows not fed phosphorus, in which it results in subnormal function and conformation.—E. M. Robinson.

Montedónico, L. A., Fynn, C. A., & Vedani, F. O. (1939). Resultados de los ensayos de suministro de fosfosal en campos afectados por osteomalacia. **[Results of Experiments in Supplying Animals with "Fosfosal" on Grazings where Osteomalacia is Prevalent].**—*Rev. Fac. Agron. Univ. Montevideo.* No. 18. pp. 115–141. [Abst. in *Herbage Abstr.* **10.** 4, copied *verbatim.* Signed: G. M. R.]

An account is given of the results of distributing (1937 to 1939) 31,000 kgs. of a mineral lick in the osteomalacia regions of Uruguay. Information on the nature of the soil, the hardness of the water, and the botanical and chemical composition of the herbage in the affected regions is presented. The mineral lick employed has been entirely satisfactory in its results, but the necessity of supervising the composition and consumption of similar products, in the interests of Uruguayan agriculture, is noted.

Johnson, S. R. (1940). **Growth on Manganese-Low Rations.**—*Proc. 33rd ann. Meet. Amer. Soc. Anim. Prod. 1940.* pp. 325–331.

Pigs, sheep, rabbits, and g. pigs were fed rations containing only 0·3 p.p.m. of manganese, but the apparent inadequacy of the rations in factors other than Mn prevented successful results except in the case of the pig. In this species, growth and condition appear to have been excellent on a low-Mn diet consisting of milk powder 44, cane sugar 50, and soya bean oil 6, to every 100 lb. of which were added 9·04 g. ferric nitrate and 0·63 g. copper sulphate. Control animals received 100 p.p.m. Mn, added to the diet as the sulphate. A number of cases of lameness occurred in both high-Mn and low-Mn groups, but this is attributed to infection resulting from the use of cold concrete floors. Satisfactory reproduction was not obtained with the experimental rations employed.

It is thus apparent that pigs may grow normally on much lower intakes of Mn than would occur even in normal practice. The question of reproduction on low-Mn diets requires further study.—A. N. Worden.

Morris, M. L., & Russell, W. C. (1939). **Vitamins and Vitamin Preparations in Small Animal Practice.**—*J. Amer. vet. med. Ass.* **95.** 555–566.

The possibilities of employing vitamin therapy in small animal practice are reviewed, and two of the authors' hitherto unpublished observations are recorded in brief, *viz*, (1) that canine hysteria did not develop in either adult dogs or puppies maintained for several weeks upon a vitamin B_1 deficient diet, and (2) that dogs on nicotinic acid deficient diets developed clinical evidence of blacktongue in 46–56 days.

This second observation is in good agreement with that of GOLDBERGER and SEBRELL (1930). —ALASTAIR N. WORDEN

HOGAN, A. G., & MCROBERTS, V. F. (1940). **Vitamin Deficiencies in a Ration for Brood Sows.**—*Proc. 33rd ann. Meet. Amer. Soc. Anim. Prod. 1940.* pp. 139–143.

During experiments designed to investigate the adequacy for brood sows of the more commonly used feeding stuffs, high mortality occurred among the offspring of sows kept on concrete floors and given a ration consisting of yellow maize (77%), tankage (10%), linseed and lucerne meals (each 5%), together with 1% cod liver oil and mineral supplements. Most of the deaths occurred within the first two weeks of life, and there was a high incidence of diarrhoea, skin lesions, and leg weakness among the survivors. Somewhat better results were obtained with a maternal diet modified from the beginning by the inclusion of 5% each of molasses and soya bean oil, and with daily allowances per sow of 100 mg. nicotinic acid, 5 mg. riboflavin and 5 mg. vitamin B_1. Results, however, were much better when the original diet was supplemented by liver meal or yeast [amounts not stated], indicating the need for vitamins other than [or in amounts greater than] those present in the second maternal diet. Piglets from sows receiving the second diet were treated daily with 800 μg. vitamin B_6 and 500 mg. of a crude lucerne concentrate, and showed much greater weight gains than untreated litter-mates.—A. N. WORDEN.

NORRIS, L. C. (1941). **The Nutritional Deficiency Diseases of Chickens.**—*J. Amer. vet. med. Ass.* **98.** 200–205.

It is considered that, of the many deficiency diseases of the fowl, only those due to lack of manganese and of vitamins A and D and of riboflavin appear to be of much practical importance. The incorporation in the diet of small quantities of manganese sulphate and the use of such foodstuffs as high-carotene lucerne meal, fish oils of known potency, and either milk by-products or dried yeast or liver are the measures recommended. [It should be pointed out that there is a quantitative aspect of the deficiencies described which does not receive sufficient emphasis in the present article. The amount of supplement to be fed depends upon the composition of the diet, as well as upon other factors, and the mere inclusion of small quantities of yeast will not necessarily give protection against vitamin B deficiency, *e.g.*, curled-toe paralysis has been reported in chicks receiving diets containing as much as 5% yeast.]—ALASTAIR N. WORDEN.

HAGAN, A. G., RICHARDSON, L. R., JOHNSON, P. E., & NISBET, Ruth N. (1940). **Pigeon Anemia as a Deficiency Disease.** —*J. Nutrit.* **20.** 203–213.

Trapped wild pigeons were maintained in captivity until their weights became steady, when they were given a basal diet comprising casein, sucrose, cellulose, salt mixture, and cod liver oil. There was a rapid loss of weight in all cases, and about 25% of the birds developed polyneuritis. When the weight of the surviving birds had fallen to 70% of its original level, varying amounts of vitamin B_1 were given, but the development of the anaemia was not prevented, and riboflavin, nicotinic acid, and wheat germ oil were similarly without effect upon the course of the disease. WELLS' "tikitiki" extract [(1921). *Philipp. J. Sci.* **19.** 67.] was, however, curative, and it is therefore suggested that the anaemia may be due to the lack of some previously unrecognized factor, although birds which received the basal diet supplemented throughout with vitamin B_1 did not develop severe anaemia over a period of 20 weeks. Inanition was not regarded as of aetiological significance.

Diminution of the numbers of red blood corpuscles was first observed in from 5–7 weeks, and the condition could be recognized clinically about the tenth week after the commencement of the basal diet. Deformed cells suggestive of those seen in sickle cell anaemia were sometimes seen.—ALASTAIR N. WORDEN.

COOMBES, A. I., OTT, G. L., & WISNICKY, W. (1940). **Vitamin A Studies with Foxes.** —*N. Amer. Vet.* **21.** 601–606.

Male fox pups, 32–35 days old, were provided with a basal diet comprising :– lean horse meat 65 parts, ground green bone 10, dried bread 10, intestines 5, cornflakes 5, kelp meal 1·5, dried figs 1·5, skim milk 1, and brewer's yeast 1, the whole being made into a suitable consistency by the addition of water. The animals appeared to grow normally and to remain in excellent health, and at 210 days of age their weights were not significantly inferior to those of animals receiving the normal stock diet or to those of controls receiving the basal diet together with supplements of cod liver oil or of crystalline β-carotene equivalent to 1,500 I.U. of vitamin storage. In the basal group and

in that receiving the carotene supplement, this was of the order of only 2 μg. per g., whereas the average value in the group which had received cod liver oil was 122 μg. per g.

It is therefore concluded that the vitamin A requirements of the growing fox appear to be of a comparatively low order, and that further evidence has been acquired for the relatively poor utilization of carotene by carnivora.

—Alastair N. Worden.

I. Hughes, E. H. (1940). **The Minimum Requirement of Riboflavin for the Growing Pig.**—*J. Nutrit.* **20.** 233–238.

II. Hughes, E. H. (1940). **The Minimum Requirement of Thiamin for the Growing Pig.**—*Ibid.* 239–241.

III. van Etten, C., Ellis, N. R., & Madsen, L. L. (1940). **Studies on the Thiamin Requirement of Young Swine.**—*Ibid.* 607–622.

I. Uniform groups, each of five pigs weighing about 80 lb. apiece, were provided with basal diets comprising sucrose, purified casein, rice bran filtrate, mineral mixture, and cod liver oil, together with supplements of vitamin B_1 and nicotinic acid equivalent to 6 and 15 mg. respectively per 100 lb. body weight daily. One group served as negative controls, and three other groups received daily supplements of riboflavin at the rate of 1, 3, and 6 mg. respectively. A fifth group received 3 mg. riboflavin and an additional 6 mg. vitamin B_1 per 100 lb. body weight. The three groups receiving 3 mg. or more of riboflavin grew equally well, and were far superior to the group receiving only 1 mg., although this in turn was superior to the control group. It is therefore concluded that the minimum daily requirement of riboflavin by the young growing pig lies between 1–3 mg. per 100 lb. body weight.

II. A similar experiment to I, in which 3 mg. riboflavin per 100 lb. body weight daily was substituted for vitamin B_1 in the basal diet. One group served as negative controls, and began to lose weight at about the fourth week of the experiment. In three other groups which received 1, 3, and 6 mg. respectively of vitamin B_1 per 100 lb. body weight daily, growth was almost equally good. From this and from unpublished data upon the vitamin B_1 contents of the muscles of animals in the various groups, it is concluded that the daily requirement of vitamin B_1 by the young growing pig is approximately 1 mg. per 100 lb. body weight.

III. These experiments were conducted with 36 three-week-old pigs which were housed in metabolism cages fitted with ½″ screen floors and maintained at 72° F. ±2°. Basal diets comprising dried liver, dried whey, casein, sucrose, dextrin, lard, agar, cod liver oil, and salts were employed, but proved unsuitable when autoclaved, since the 12 pigs to which they were so given developed symptoms suggestive of a multiple deficiency and did not respond to vitamin B_1. In later experiments, therefore, the diets were treated with sodium sulphite and sulphur dioxide, which appeared to destroy vitamin B_1 specifically. Pigs receiving unsupplemented diets thus treated developed anorexia, occasional vomiting, extreme emaciation, and subnormal rectal temperature, and died after an average period of five weeks. Growth was restored by the addition to the diet of crystalline vitamin B_1 hydrochloride. Animals which received 37 μg. or 50 μg. per kg. body weight daily grew equally well and were superior to those receiving only 25 μg. These values when recalculated on the basis of food intake, indicated that the optimum requirement of vitamin B_1 under the conditions of the experiment lay between 106 and 120 μg. per 100 g. of carbohydrate and protein consumed.

—Alastair N. Worden.

Williams, R. R. (1940). **Inefficiency of Pantothenic Acid against the Graying of Fur.**—*Science.* **92.** 561–562.

Studies were reported by György and Poling [*V. B.* **11.** 121.] which indicated that pantothenic acid has a curative effect on the nutritional achromotrichia of rats. Experiments are described here which demonstrate that neither pantothenic acid concentrates nor pure pantothenic acid exhibited a preventive or curative effect on the grey hair of rats, although the rate of growth and length of life were greatly enhanced. It is pointed out that the diet used by György and Poling differed from that used by W. by the substitution of 8% butter for 2% maize oil.—R. Allcroft.

Ansbacher, S. (1941). ***p*-Aminobenzoic Acid, a Vitamin.**—*Science.* **93.** 164–165.

Experiments indicate that *p*-aminobenzoic acid, considered by Fildes and by Rubbo and Gillespie [*V. B.* **11.** 129 and 433.] to be an essential metabolite for bacteria, is a vitamin, namely, a chromotrichia factor for the rat, and a growth-promoting factor for the chick. When greying of the fur had developed in rats maintained on a basal ration and receiv-

ing daily supplements of thiamin, riboflavin, pyridoxin, nicotinic acid, inositol, choline chloride, and calcium pantothenate, the addition of *p*-aminobenzoic acid caused the appearance of black hair within one month. The control animals not receiving the acid continued to show typical achromotrichia [see also *V. B.* **11.** 253]. Chicks reared on a diet supplemented with ample amounts of vitamin K and calcium pantothenate failed to gain in weight and died in about a month; addition of 300 μg. of *p*-aminobenzoic acid per g. of ration resulted in better growth and longer survival times. From these results it appears that *p*-aminobenzoic acid is one of the factors of the vitamin B complex.—R. ALLCROFT.

SCHUMACHER, A. E., & HEUSER, G. F. (1940). **Some Properties of the Alcohol-Precipitate Factor with Further Results of Its Effect on Chicks and Hens.**—*Poult. Sci.* **19.** 315–320.

It has previously been reported from the authors' laboratory [*V. B.* **11.** 52.] that chicks and hens require some hitherto unidentified factor or factors for growth and reproduction, and this factor could be precipitated from an aqueous extract of yeast by the addition of 90% ethyl alcohol. The present paper reports the effects of adding riboflavin or the "alcohol-precipitate factor", or both, to a basal diet believed to be complete in all other known essential nutrients, and containing about 80 μg. of riboflavin per 100 g. Chick growth, egg production, and hatchability, and maintenance of body weight by adult hens were satisfactory only when both supplements were added, indicating that the level of riboflavin in the basal diet was inadequate and confirming the need for the new growth factor.

The "a.-p." factor was found to be dialysable and thermostable.—ALASTAIR N. WORDEN.

LILLEENGEN, K. (1940). Vaxartad muskeldegeneration vid experimentell C- respektive B_1-avitaminos hos marsvin. [**Waxy Muscle Degeneration in Experimental Avitaminoses C and B_1 in the G. Pig**].—*Skand. VetTidskr.* **30.** 165–183. [Abst. from author's English summary].

The occurrence of Zenker's degeneration of the skeletal and cardiac muscles is described in g. pigs maintained on vitamins C and B_1 free diets. Those on the C free diet all developed degeneration of the skeletal muscles and in one animal the myocardium was affected; half of the group on the B_1 free diet developed Zenker's degeneration both of skeletal and cardiac muscles while those on a C + B_1 free diet all showed degeneration in the skeletal muscles. The muscle degeneration was in almost all cases accompanied by dystrophic calcification and muscular atrophy. Histological examination of the teeth of the g. pigs on the C free and C + B_1 free diets revealed severe scorbutic lesions, while such lesions were absent in those on the B_1 free diet and the control group.

Blood analyses showed that the B_1 content of the blood of the B_1 deficient groups was considerably lower than that of the controls, but the fact that any B_1 at all was found in the blood is considered by L. to indicate that g. pigs can synthesize the vitamin to some degree themselves, but as coprophagy was observed in the B_1 free group, especially among the animals which did not develop muscular degeneration, this may account for the presence of some B_1 in the blood.

The degeneration of the skeletal and cardiac muscles observed in the C free group agrees with observations of other investigators, but its occurrence in g. pigs on a B_1 free diet is not known to have been observed before.

VERSTRAETE, A. (1939). Klinische beelden van C-hypovitaminose bij den hond. [**Clinical Picture of Hypovitaminosis C in Dogs**].—*Vlaam. Diergeneesk. Tijdschr.* **8.** 193–209. [English, French and German summaries]. [Abst. from English summary].

It is pointed out that a deficiency of vitamin C detected by chemical methods is not necessarily equivalent to a physio-pathological deficiency of the vitamin. An examination of normal dogs showed that elimination of ascorbic acid is about 5–30 mg. % in the urine. V. claims to have observed clinical syndromes of C hypovitaminosis in dogs in the following cases:– rickets, dental caries with secondary buccal injuries, infectious or post-infectious states, and in some cases of purpura haemorrhagica. In all these cases clear therapeutic effects were claimed after administration of vitamin C. In the two cases of purpura haemorrhagica examined, V. was not able to investigate the possible intervention of vitamin P, the capillary fragility factor.

FOOY, J. P. (1939). Twee gevallen van scorbuut (?) bij den hond. [**Two Probable Cases of Scurvy in Dogs**].—*Tijdschr. Diergeneesk.* **66.** 447–451.

It is known that dogs produce the anti-scorbutic vitamin in the liver and intestines, but

little is reported in the literature on avitaminosis in these animals.

Two cases of scurvy-like conditions are described. An eight-year-old dog showed the following symptoms :– fever, capricious appetite, pain in the abdominal wall, albuminous urine mixed with cells from the kidney and blood. There were worm eggs in the faeces. Treatment was given for ancylostomiasis and nephritis. Six months later the animal was very thin, showed inappetence, and drank copiously. Anaemia increased, the ocular mucous membranes being pale and blood-stained ; the gums were swollen and bloody ; the saliva was abundant and blood-stained. Ascorbic acid was given ; the flow of blood disappeared by the fourth day after the second injection, and the dog became normal.

A seven-month-old dog had periodical epileptic attacks, anaemia, swollen abdomen, and ascaris eggs in the faeces. Anthelmintic treatment was given. Four months later the patient showed symptoms analogous to those described for the first case. The diet, poor in vitamins (boiled milk and cooked meat, polished rice, no vegetables) was modified by adding lemon juice and vegetables. Vitamin B_1 was administered and injections of ascorbic acid were given. After a few days the haemorrhages disappeared completely and the dog became normal.

The clinical symptoms observed and results obtained by the administration of vitamin C suggest that these were cases of scurvy.—L. T.

Neuweiler, W. Z. (1939). Kommt Citrin (Vitamin P) in der Milch vor ? **[Does Citrin (Vitamin P) Occur in Milk ?].**—*Z. Vitaminforsch.* **9.** 338–342. [English summary]. [Extract from abst. in *Dairy Sci. Abstrs.* **2.** 164, copied *verbatim.* Signed : S. K. K.]

Citrin could not be chemically demonstrated either in cow's milk or in human milk, in the latter case even after intravenous injection of 50 mg. of the substance.

Mackenzie, C. G., Levine, M. D., & McCollum, E. V. (1940). **The Prevention and Cure of Nutritional Muscular Dystrophy in the Rabbit by Alpha-Tocopherol in the Absence of a Water-Soluble Factor.**—*J. Nutrit.* **20.** 399–412.

The authors were unable to confirm the findings of Morgulis *et al.* [*V. B.* **11.** 55.], that a water-soluble factor as well as a fat-soluble factor (probably vitamin E) was necessary for the prevention and cure of nutritional muscular dystrophy. Provided that adequate precautions were taken to prevent destruction of the supplement by the diet, the disease could be cured or prevented by the oral administration of α-tocopherol alone. The procedure adopted was to withhold food for some hours before and after dosing, and in these circumstances the condition in young growing rabbits could be prevented by the administration of 6–18 mg. α-tocopherol per week. From this and from curative experiments, it is concluded that the daily requirement for α-tocopherol by the rabbit is approximately 0·6–1·0 mg. per kg. body weight. Wheat germ oil was effective when administered apart from the rest of the diet, but not otherwise.

A chronic dystrophy was induced by the administration of sub-optimal amounts of α-tocopherol (3–6 mg. weekly), and it is stated that such cases furnish excellent material for a study of the metabolism of the disease. Vitamin B_6 appeared to exert no influence upon the development of the condition.—A. N. Worden.

György, P., Rose, Catharine S., Hofmann, K., Melville, D. B., & du Vigneaud, V. (1940). **A Further Note on the Identity of Vitamin H with Biotin.**—*Science.* **92.** 609.

From the reactions of a crystalline biotin ester prepared by the authors from a liver concentrate, it is concluded that biotin and vitamin H are one and the same compound. It is also confirmed that coenzyme R and biotin are identical.—R. Allcroft.

Dam, H., & Glavind, J. (1940). Die Wirkung von Vitamin K bei alimentärer und experimentellokklusions-ikterischer K-Avitaminose bei Hühnern. **[The Effect on Chickens of Vitamin K Deficiency Produced by Diet or by Experimental Obstructive Jaundice].**—*Z. Vitaminforsch.* **10.** 71–79. [Abst. in *Nutr. Abstr.* **10.** 307, copied *verbatim.* Signed : A. M. Copping].

The action of vitamin K was studied in chickens which had received a synthetic diet lacking in vitamin K from the time that they weighed 100 g. and in older chicks which had had their bile ducts ligatured when they weighed about 400 g., and developed severe jaundice in 26 to 28 days. In both groups injection of vitamin K as a concentrate prepared from alfalfa was equally effective in raising the prothrombin content of the blood.

PUBLIC HEALTH

KOCH, S. O. (1940). Organisationen af maelkekontrollen, specielt med henblik paa forholdet mellem besaetningskontrol og laboratoriekontrol. [**Organization for Milk Control, Particularly as Between Farm and Laboratory Work**].—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 460–479. Discussion pp. 480–482. [German summary].

A discussion of milk control conditions in Denmark, where stress has been laid on inspection at the source (milk production at the farm). K. advocates the development of a large central laboratory milk-testing service as a means of keeping a better control over milk after it has left its source.—J. E.

MOLONEY, P. J. (1941). **The Phosphatase Test.**—*Canad. publ. Hlth J.* **32.** 213–215. [Author's summary copied *verbatim*].

During the eight years since its introduction the phosphatase test, or some modification of it, has been tried out on a large scale by workers in different countries. The results have substantiated the claim that the test is of great value in controlling the efficiency of pasteurization.

Some anomalous results which have been obtained with the phosphatase test have drawn attention to certain questions in connection with pasteurization which might be worthy of investigation or reinvestigation.

GUNNISON, J. B., LUXEN, M. P., MARSHALL, M. S., & ENGLE, B. Q. (1940). **Hemolytic Streptococci in Raw Market Milk.**—*J. Dairy Sci.* **23.** 447–455.

One sample from each of 444 consignments of milk from different shippers to San Francisco was examined over a period of three months for the presence of haemolytic streptococci of types producing both wide and narrow zones of haemolysis. Most of the samples yielded less than 300 haemolytic streptococci per c.c. Of 134 samples showing these organisms, 125 belonged to Lancefield's serologic group B, but organisms of every group except F were found. The fact that high grade milk produced under rigid inspection may contain haemolytic streptococci of human origin is regarded as being a strong argument for universal pasteurization, even though the number of instances in which such organisms are found is extremely low.—H. V. HUGHES.

STAHL, S. (1939). **A Tuberculosis Epidemic Caused by Milk-borne Infection.**—*Brit. J. Child. Dis.* **36.** 83–99.

In the autumn of 1936 an outbreak of TB., mainly affecting children, occurred in Horred, Sweden. The source of infection was a cow with active TB. of the udder. P.M. examination revealed recent TB., mostly in the right lung and pleura; the left half of the udder was enlarged and numerous tuberculous foci were found. This animal belonged to a herd attached to the State organization for the prevention of TB. in cattle. The herd had been clinically examined in May 1935, when one affected animal was removed, and again in May 1936, when no tuberculous animals were discovered. In view of this outbreak, the urgent need for regular tuberculin testing of cattle and for pasteurization of the milk is obvious.

—. (1939). [**Report of Committee on**] **Food Hygiene** [**American Veterinary Medical Association**].—*J. Amer. vet. med. Ass.* **95.** 598–602.

In 1936, of the urban communities in the U.S.A. with a population of 1,000 or over, nearly two-thirds had, in their milk inspection services, persons with an academic qualification in medicine, veterinary medicine, public health, sanitary engineering, agriculture, or other scientific subject. Nevertheless, only 44% of the total number of inspectors had such qualifications, and only 19% of these were veterinarians. A number of universities offer training facilities in public health subjects, many holding short summer school courses. Details are given of the qualifications required for the three grades of milk inspectors in New York State. Mention is made of problems of food hygiene other than that of milk control, *viz*, (1) the necessity for devoting greater attention to milk hygiene on the farm; (2) the provision of adequate abattoir facilities for all towns; (3) the need for veterinary inspection of poultry and rabbits, and (4) the accumulation of information regarding the public health aspect of foods of animal origin.—H. V. H.

AASER, C. S. (1940). Den veterinaere naèringsmiddelkontroll og hygiene. [**Veterinary Food Control**].—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 448–458. Discussion pp. 458–460. [In Danish]. [Abst. from English sum-

mary].

A short survey is given of the development of food inspection, with special reference to the rapid advance in this matter since the war of 1914–18. At present inspection is done by medical men and chemists as well as by veterinarians. After discussing the qualifications of these different groups to deal with food inspection, A. maintains that in view of their training the veterinarians are best equipped for that purpose.

An account is given of the various groups of foodstuffs and of their treatment by the veterinary inspection service. A. is of the opinion that veterinarians should study the subject of food inspection on broader lines than in the past. He suggests that veterinary graduates should have one year of post-graduate training in food inspection or else that the instruction at the veterinary college should be re-arranged so as to include a special course for those who wish to specialize in food hygiene.

van Oijen, C. F. (1939). Toepassing bij de keuring van moderne inzichten inzake de pathogenese der tuberculose. **[The Pathogenesis of Tuberculosis in Relation to Meat Inspection].**—*Tijdschr. Diergeneesk.* **66.** 933–939.

The author discusses the findings of Nieberle on the pathogenesis of TB., and states that meat-inspection practice should be modified in accordance with the recent observations on primary complex, and early and late generalization.

He points out the necessity of recognizing the later stages of TB. in meat inspection and states that meat containing tubercle bacilli should be seized. Attempting to apply the knowledge obtained by meat inspection experience, he gives a list of tuberculous conditions :– (1) subject to total or partial seizure, (2) liable to sterilization, and (3) those for which microscopic examination is advisable.

—L. Tobback.

THERAPEUTICS

Schern, K., & Schröder, J. (1940). Versuche über die bactericide Wirkung von Chlorsilber und der aus ihm durch Einwirkung von Licht gebildeten Zersetzungsprodukte. **[Bactericidal Action of Silver Chloride and the Breakdown Products Produced from it by the Action of Light].**—*Arch. wiss. prakt. Tierheilk.* **76.** 150–162.

Silver chloride powder inhibits the growth of the bacteria of milk. Surgical dressings were treated with silver chloride dissolved in ammonia and dried in the dark ; a bactericidal effect was produced and they remained sterile for long periods. Similar bactericidal actions were produced when the material was steeped in silver chloride-ammonia, dried, and then exposed to sunlight.—J. M. Robson.

—. (1940). **May & Baker's Sulphonamides in Veterinary Practice.** pp. 39. Dagenham : Pharmaceutical Specialities (May & Baker) Limited. [8vo].

This is a short review of the preparations and properties of the drugs of the sulphonamide group made by the firm of May and Baker and it makes, of course, no reference to different sulphonamides made by other firms. The drugs mentioned are sulphanilamide, proseptasine, soluseptasine, sulphapyridine (M & B 693), sodium sulphapyridine (M & B 693 soluble), and sulpthiazole (M & B 760). The chemistry, pharmacology, and chemotherapeutic activity of these drugs are briefly described. Their application in veterinary medicine is given in some detail for various animals, and this information is also given in a convenient tabular form ; dosage and method of administration are described, as are also the toxic symptoms that may be encountered.—J. M. R.

Kalmanson, G. M. (1940). **The Bactericidal Power of Sulfanilamide under Anaerobic Conditions.**—*J. Bact.* **40.** 817–822.

At 40°C., sulphanilamide (20 mg. %) in tryptose-phosphate-glucose broth is able to sterilize streptococcus C 203 in 48 hours either aerobically or anaerobically. No action under these conditions was noted at 37°C. Marked inhibition and sterilization of small inocula of *Bacterium coli* was produced both aerobically and anaerobically in the presence of ascorbic acid.—J. M. Robson.

Bliss, E. A., & Ott, E. (1940). **Effect of Sulfapyridine, Sulfathiazole and Sulfamethylthiazole upon Severe Staphylococcal Infection in Mice.**—*Proc. Soc. exp. Biol., N.Y.* **43.** 706–709.

Sulphathiazole and sulphamethylthiazole, administered as 1% of the diet, showed a distinct therapeutic value in prolonging the lives of mice heavily infected with *Staph.*

aureus. Sulphapyridine was somewhat less efficient.—J. M. Robson.

Colebrook, L., & Francis, A. E. (1941). **Elimination of Streptococci from Superficial Wounds by Sulphanilamide Powder.**—*Lancet*. **240**. 271–273.

The effect of applying sulphanilamide powder to 62 superficial wounds infected with haemolytic streptococci was studied. The organism usually disappeared from the wounds within 3–4 days and did not reappear. Infections with haemolytic streptococci group D proved resistant to local treatment. Neither sulphanilamide nor sulphathiazole had consistent effects on the staphylococci, *Proteus vulgaris*, or *Pseudomonas pyocyanea*, which were also present in many of the wounds. Before beginning treatment the wounds were thoroughly cleansed; finely powdered sulphanilamide powder was then insufflated, tulle gras applied over it and covered with gauze well moistened with saline.—J. M. Robson.

Levaditi, C., Gérard-Moissonnier, Bréchot, H., & Tournay, R. (1940). Les plaies de guerre contaminées de streptocoque et leur chimiothérapie. **[The Chemotherapy of Streptococcus-Contaminated Wounds]**.—*Bull. Acad. Méd. Paris*. **123**. 39–56.

The strains of streptococci obtained from these wounds were usually of low virulence, although they were in most cases haemolytic. Their virulence could be increased by passage through mice. Local treatment with rubiazol and with sulphanilamide of wounds infected with streptococci gave very satisfactory clinical results, but did not always kill off the streptococci in the wounds. It is suggested that the defensive mechanisms of the body, and more particularly those of the tissues and fluids of the wound, were increased. Certain wounds injected with streptococci were chemotherapeutically sensitive to treatment with sulphonamides, while others were insensitive. It is concluded that local treatment of wounds with sulphonamides should be carried out on a large scale.—J. M. Robson.

Heishman, J. O., & Miller, W. T. (1940). **The Action of Sulfanilamide on Mastitis Streptococci in Vitro.**—*J. Amer. vet. med. Ass.* **96**. 176–179.

Considerable variation was observed in the ability of different strains of streptococci to survive in various concentrations of sulphanilamide under the same cultural conditions. Some strains could survive concentrations of 0·8% for 14 hours or 0·2% for 72 hours at 38°C. Increase in the temperature enhanced the bactericidal action of sulphanilamide, but no correlation was noted between the action of the drug *in vitro* and *in vivo*.—J. M. Robson.

Seelemann, M., & Siemonsen, K. (1939). Ist das Argento-Weidnerit ein biologisches Heilmittel zur Behandlung des gelben Galtes? **[Use of Argento-Weidnerit in the Treatment of Mastitis]**.—*Tierärztl. Rdsch.* **45**. 105–110.

The authors could not confirm the findings of previous investigators on the value of this drug in the treatment of mastitis. Irritant effects on the glandular tissue were observed in some cases, leading to indurative changes and prolonged cessation of milk production. The use of this drug in mastitis is not recommended.—J. M. Robson.

Seeleman, M., & Wutzler, P. (1939). Galtbehandlungsversuche mit 2 modifizierten Acridinfarbstoffen (Entozon A und Entozon B). **[Treatment of Mastitis by Two Modified Acridine Dyes (Entozon A and Entozon B)]**.—*Arch. wiss. prakt. Tierheilk.* **75**. 124–133.

The two modified preparations have no advantages over the original preparation (Entozon-granulat). They are more irritant and have less chemotherapeutic action.—J. M. Robson.

Götze, R. (1939). Klinische und experimentelle Prüfungen des Sulfanilamidpräparate Prontosil, Prontalbin und Astrosol. 1. Mitteilung: Infizierte Geburten und puerperale Störungen beim Pferd. **[Clinical Trials of Prontosil, Prontalbin, and Astrosol. I. Puerperal Infections in Mares]**.—*Dtsch. tierärztl. Wschr.* **47**. 421–423.

This is a summarized account of the discoveries leading up to modern sulphonamide therapy, starting from the work of Domagk, and of the methods adopted to prevent losses in mares due to streptococcal and staphylococcal infections. It is not an account of original work. A long list is given of human and animal diseases which are said to be cured by sulphonamide treatment [in many of these diseases, sulphonamide therapy is almost certainly useless].—J. R. M. Innes.

Pasquini. (1939). Observations cliniques sur l'utilisation de l'eau physiologique formo-

lée en injections intraveineuses, dans le traitement de la rickettsiose du chien. **[Treatment of Canine Rickettsiasis by Intravenous Injections of Formolized Physiological Saline]**.—*Rec. Méd. vét.* **115.** 216–219.

Five cases of infection with *R. canis* were treated by intravenous injections of 10 c.c. normal saline to which 7–10 drops of formalin were added, the treatment being repeated in 48 hours, and a third dose given if required. After treatment a fall of temperature with return to health occurred in all the cases in a few days. The symptoms of this infection are given as a sudden onset of fever, the temperature rising to 40°C. or over, great depression, complete loss of appetite, and rapid emaciation.
—U. F. Richardson.

Gallo, P., & Calderón, F. R. (1939). Ensayos de proteinoterapia anespecifica en las enfermedades de ultravirus de los pollos. (Diftero-viruela y coriza infecciosa). **[Non-Specific Protein Therapy of Virus Diseases (Fowl Pox and Avian Coryza)]**.—*Rev. Med. vet. Parasit., Caracas.* **1.** 3–20. [English and German summaries]. [Abst. from English summary].

The authors tested the value of protein therapy against fowl pox and fowl coryza in 1,137 chickens. The mortality from fowl pox was 25% in birds given injections of blood serum and haemoglobin or of egg albumen, whereas it reached 73% in the untreated controls. The mortality from fowl coryza was 55% among controls, 6% in birds injected with egg albumen, and 7% in those injected with blood serum.

The authors conclude that although protein therapy is non-specific, it gives good results and is particularly useful in fowl coryza for which no satisfactory vaccine has been prepared.

Kempf, J. E., & Soule, M. H. (1940). **Unsuccessful Therapy in Experimental Equine Encephalomyelitis with Salt Solutions of Varied Concentrations and Sulfanilamide Compounds.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 107–110.

The intraperitoneal injection of hyper- or hypo-tonic saline into injected rats did not alter the course of the infection, which was also unaffected by the administration of sulphonamides (sulphanilamide, sulphapyridine, sulphamethylthiazole).—J. M. Robson.

Kopp, I., & Solomon, H. C. (1940). **The Untoward Reactions of Tryparsamide.** —*Amer. J. Syph.* **24.** 265–283. [Authors' summary copied *verbatim*].

The incidence and type of reactions following 43,808 injections of tryparsamide given to 829 patients over a 16 year period are described.

Bowesman, C. (1940). **A Short Report on the Use of 4 : 4'-Diamidino Stilbene in the Treatment of Human Sleeping Sickness.** —*Ann. trop. Med. Parasit.* **34.** 217–222.

This is a water-soluble drug suitable for intramuscular or intravenous administration. It is given in doses up to 1 mg. per kg. body weight. Administration of the drug produces rapid amelioration of all symptoms of sleeping sickness, and it cures the disease in the early and intermediate stages; it is not suitable in cases in which the C.S.F. protein is above 0·05%. Injection of the drug causes marked stimulation of the autonomic nervous system; the disturbance is temporary and no permanent harm results.—J. M. Robson.

Budac, O. (1938). Contributiuni la studiul tratamentului durinei si naganei experimentale cu anticoman. **[Treatment of Dourine and Nagana with "Anticoman"]**.—*Thesis, Bucarest.* pp. 69. [Abst. from French summary].

B. investigated the preventive and curative value of "anticoman" in *Trypanosoma equiperdum* and *T. brucei* infections. The toxic dose is 0·0815 g. and the therapeutic dose 0·0036 g. per kg. body weight. The therapeutic value did not appear to be very great, 38·46% of rats infected with *T. equiperdum* and 15·38% of those infected with *T. brucei* being cured. It had, however, a greater preventive value, a dose of 0·0092 g. per kg. body weight injected 24 hours before infection with *T. brucei* preventing the development of the infection, although the same dose had no effect on *T. equiperdum*; injection of "anticoman" simultaneously with either organism completely prevented the development of any symptoms of disease.

The trypanocidal action is apparently exercised directly on the parasites and does not act by sugar privation.

Lumsden, W. H. R., & Bertram, D. S. (1940). **The Effect of Plasmoquine and of Praequine on the Subsequent Development of the Gametocytes of *Plasmodium gallinaceum* Brumpt, 1935, in *Aëdes aegypti* (L.).**—*Ann. trop. Med. Parasit.* **34.** 161–172.

The examinations were made as quantitative

as possible by using oocyst counts as evidence of the effects of the drugs. The study was designed to ascertain the length of time needed before the fowls were rendered non-infective to mosquitoes feeding on them, and whether viable gametocytes would again appear in the circulation after dosage with the drugs—a problem which still remains unsolved. 15 mg. per kg. body weight of plasmoquine rapidly reduced the total parasites and although mosquitoes were not infected this could not be regarded as evidence of the drug's being selective as regards the sexual forms, although this is not unlikely. No obvious effects on the total parasite level were observed with the lower doses used, yet when 2·8 mg. per kg. were given orally no mosquitoes were infected 4–22 hours after the dose. Complete sterilization was not effected by 1·4 mg. per kg. in 12 hours, but no mosquitoes were infected after that time. Doses of 0·14 mg. per kg. did not prevent massive oocyst development in mosquitoes fed on the birds receiving them. There was no difference in the effects of plasmoquine or praequine at the two smaller dosages.

—C. HORTON SMITH.

LANDSBERG, J. W. (1940). **The Treatment of Canine Piroplasmosis with Sulfanilamide.**—*J. Amer. vet. med. Ass.* **97.** 309–311.

Details are given of the response of seven splenectomized dogs to oral administration of sulphanilamide. Although no definite conclusions could be drawn from so few cases, the drug did appear to reduce the number of parasitized erythrocytes in the peripheral circulation, and to reduce the temperatures by 2–3 degrees. In several cases the treated dogs lived longer than the untreated controls, but the virulence of the organism was not affected by sulphanilamide.—M. L. BINGHAM.

GAPUZ, R. B. (1940). **Derris Root Infusion as a Tickicide for Cattle and Horses.**—*Philipp. J. anim. Indust.* **7.** 431–437.

Infusions of crushed, dry derris roots in water, varying in concentration from 1·25–5% were found to be effective in killing ticks on cattle and horses. The smaller ticks died in 24 hours and the larger ones in 48 hours. To ensure the destruction of the ticks, the skin and hair had to be thoroughly wetted with the infusion.

Derris root infusion is recommended in preference to arsenical solutions, where application is by swabbing or spraying.—W. MOORE.

GAPUZ, R. B. (1940). **Derris Root Infusion for Psoroptic Scabies in Horses and Carabaos.**—*Philipp. J. anim. Indust.* **7.** 409–418.

Infusions of crushed derris roots in water at a concentration of 2·5% fresh roots or 1% dried roots, applied twice at an interval of one day, were found to be effective against equine scabies. For bovine scabies a concentration of 3% fresh roots or 1·5% dry roots was required. The derris infusion did not damage the skin, hair or eyes of the treated animals.—W. M.

OBITZ, K., & WADOWSKI, S. (1938). Przyczynki do zwalczania pasożytów zwierząt domowych w praktyce. [**Control of Parasites in Domestic Animals**].—*Pam. państ. Inst. nauk. Gos. wiej. Puławy.* No. 2. pp. 96–102. [English summary]. [Suppl. to *Wiad. weteryn.* **18.** No. 223].

Carbon tetrachloride in liquid paraffin was injected subcutaneously into sheep with liver fluke infestation and the results were stated to be good. A derris product yielded good results on rabbits affected with mange.

GUTHRIE, J. E. (1940). **Preliminary Observations on the Efficacy of Diphenylamine for the Removal of Intestinal Nematodes from Dogs.**—*Proc. helminth. Soc. Wash.* **7.** 84–85.

Diphenylamine ($C_6H_5NHC_6H_5$), a substance related chemically to phenothiazine ($C_6H_4NHC_6H_4S$), when administered in doses of 3–10 g. per dog, removed 64·2% of 291 hookworms from six dogs, 61·9% of 21 ascarids from three dogs, and 83·6% of 537 whipworms from five dogs. The drug was well tolerated in these doses.—M. L. BINGHAM.

MONTGOMERIE, R. F. (1940). **Trial of Phenothiazine in Ascarid Infestation in Dogs.**—*Vet. Rec.* **52.** 665.

M. found that phenothiazine administered in doses of 6–12 g. had very little effect on ascarid infestation in eight puppies. No symptoms of intoxication were observed as a result of treatment.—M. L. BINGHAM.

BRITTON, J. W. (1941). **Phenothiazine Therapy in Draft Horses.**—*Cornell Vet.* **31.** 85.

The treatment is recorded of 44 draft horses with phenothiazine. The animals included colts, fillies, geldings, stallions, and mares, some with unweaned foals. Although their weights ranged from 1,200–2,200 lb., each one was dosed with 60 g. phenothiazine given in their grain ration, which was withheld from the

morning until midday.

Whereas the average strongyle egg count before treatment had been 2,400 E.P.G., two weeks after treatment no eggs were found except in two cases where only a small number of eggs were counted. Ascarid infestation was unaffected by the treatment.—K. M. S.

SCHMID, F., & LANGER, H. (1940). Die Wirkung von Wurmmitteln auf die verschiedenen Strongylidenarten des Pferdes. I. Allegan. [**The Action of Anthelmintics on the Various Horse Strongyles. I. Allegan**].—*Dtsch. tierärztl. Wschr.* **48.** 553–555.

When allegan is administered orally the small strongyles (*Trichonema* spp.) are especially affected and there is little or no action on the larger strongyles (*S. edentatus*, *S. vulgaris*, *S. equinus*). There is more effect on the larger strongyles when the drug is administered intravenously.—J. M. ROBSON.

I. GORDON, H. McL. (1939). **A Preliminary Note on the Chemotherapy of Oesophagostomiasis of Sheep with Special Reference to the Efficiency of Phenothiazine.**—*J. Coun. sci. industr. Res. Aust.* **12.** 203–206.

II. GORDON, H. McL. (1939). **A Preliminary Note on the Anthelmintic Efficiency of Phenothiazine Against *Haemonchus contortus* in Sheep.**—*Ibid.* 207.

III. ROBERTS, F. H. S. (1939). **A Preliminary Note on the Treatment of Oesophagostomiasis in Sheep with Phenothiazine.**—*Ibid.* 208.

I. Extensive experimental work in Australia showed that treatment with enemas of sodium arsenite (125–250 mg. per 1,200 ml. water), administered with a modified automatic drenching gun or special syringe, was highly effective against *O. columbianum*. The disadvantages of this method are that it is time consuming, and, unless applied carefully and patiently, may cause deaths from rupture of the large intestine. Many trials with the powder mixture of copper arsenate, copper tartrate, and lime devised by MÖNNIG [*V. B.* **6.** 549.] gave disappointing results, treatment being satisfactory in less than 30% of cases. It was found that purgation produced by lentin (Merck) was not an effective method of removing *O. columbianum*, and was at times followed by a considerable mortality in experimental sheep. Arecoline hydrobromide in doses of 0·06–0·5 grains administered subcutaneously had no purgative effects in sheep. Phenothiazine in doses of 0·6 g. per kg. body weight, whether administered in capsules or as a powder preceded by copper sulphate solution, was highly effective against *O. columbianum*. Toxicity trials showed that a single dose of 45 g. or three successive daily doses of 15 g. for sheep aged 1½–2 years were without ill-effects.

II. Doses of 0·3–0·75 g. per kg. body weight were highly effective against *H. contortus*. High efficiency was exhibited even when the drug was administered in capsules, indicating that it exerts its anthelmintic effects although swallowed into the rumen. It was observed that there was no development of larvae in faecal cultures prepared during the four days following administration of phenothiazine, but some appeared in cultures made from the fifth day onwards.

III. Doses of 4 g. phenothiazine suspended in liquid paraffin following doses of 2 ml. of 10% copper sulphate solution showed encouraging efficiency against *O. columbianum* and *H. contortus* in lambs 4–5 months old.

—H. McL. GORDON.

ENDRIGKEIT, A. (1939). Phytotherapeutische Versuche zur Bekämpfung der Magenwurmseuche der Schafe. [**Treatment of Stomach Worm Disease in Sheep by Feeding on *Hypericum* and *Artemisia*, Together with Carrots**].—*Arch. wiss. prakt. Tierheilk.* **75.** 109–123.

E. undertook to discover whether *Haemonchus contortus* and *Ostertagia ostertagi* infestations might be curable by dietary measures alone, without recourse to chemotherapy. Sheep were fed on turnips, *H. perforatum* (St. John's wort), *Hypericum* with carrots, carrots alone, or carrots with *A. vulgaris*. Faecal egg counts, determined by a modified Stoll technique, showed a sharp decrease after *Hypericum* and carrots had been fed, and E. concludes that this diet effected a permanent reduction in the worm burden. [The significance or otherwise of the decreased egg counts was apparently not examined statistically. No autopsies were performed on experimental or control animals, to determine the actual amount of the infestation and to discover whether a reduction did, in fact, occur. No account was taken of the fact that changes of diet are known to be capable of effecting a reduction in the worm burden of animals on the point of establishing an immunity.]—E. S.

I. Phillips, P. H., Lardy, H. A., Heizer E. E., & Rupel, I. W. (1940). **Sperm' Stimulation in the Bull Through the Subcutaneous Administration of Ascorbic Acid.**—*J. Dairy Sci.* **23.** 873–878.

II. Phillips, P. H., Lardy, H. A., Boyer, P. D., & Werner, G. M. (1941). **The Relationship of Ascorbic Acid to Reproduction in the Cow.**—*Ibid.* **24.** 153–158.

I. It is claimed that ascorbic acid therapy, when continued for several weeks, is effective in the treatment of many cases of impotency in bulls. A total of 29 such bulls was treated by the subcutaneous injection of 1–1·5 mg. ascorbic acid per 1,000 lb. body weight twice weekly, and it is claimed that in 24 cases potency was restored. Oral therapy is said to be ineffective. The ascorbic acid content of the semen, the normal value of which has been found to be 3–7 mg. per 100 ml., is considered to be of value in assessing the potency of a bull.

II. The average ascorbic acid content of plasma of 154 cows was found to be 0·39 mg. per 100 ml., with a range of 0·19–0·65 mg. per 100 ml. These values are somewhat higher than those previously obtained from 22 normal bulls, in which the average figure was 0·27 mg. per 100 ml. There were indications that breed differences existed and that the values tend to rise during oestrus. In view of the fact that this increase during oestrus could not be demonstrated in a number of cows which had poor breeding records, ascorbic acid therapy was instituted in 17 such cases which had repeatedly failed to conceive. Considerable success is claimed in cases in which the reproductive tract appeared normal, ten animals conceiving after a single service following a period of subcutaneous injections of ascorbic acid [exact dosage not stated]. A single case in which the uterus appeared to lack tone failed to respond to subcutaneous injections of α-tocopherol, of which a total of 19·25 g. dissolved in ethyl laureate was administered over a period of one month.—A. N. Worden.

Matzke, M. (1940). Der Wert der Weizenkeimölbehandlung bei der Geflügellähme. **[Value of Wheat Germ Oil Therapy in Fowl Paralysis].**—*Tierärztl. Rdsch.* **46.** 89–92.

Administration of wheat germ oil, either therapeutically or prophylactically, had no effect on the course of fowl paralysis in natural clinical cases (30) or in cases induced by artificial infection (15) or by contact (10). Incidence of disease was the same in treated as in untreated groups of chickens.—H. H. G.

Bottomley, A. C., Folley, S. J., & Watson, H. M. S. (1940). **Experiments on the Use of Chorionic Gonadotrophin (Pregnancy Urine Extract) for the Treatment of Sterility in Dairy Cattle.**—*J. agric. Sci.* **30.** 235–243.

The hormone used in these experiments was a human pregnancy urine extract standardized at 500 rat units per c.c. (henceforward referred to as P.U.). Cows which failed to exhibit oestrus for reasons other than the presence of ovarian cysts or persistent corpora lutea were treated by intravenous (i/v) or intramuscular (i/m) injections of P.U. Three out of five cows responded within 24 hours to single i/v injections of 5 c.c. P.U., and one out of four cows to an injection of 3 c.c. Two out of five cows responded immediately to a series of three i/m injection of 2 c.c. P.U. Four cows failed to respond to four i/m injections of 2 c.c. Service at the heat induced by P.U. was fertile in one case only. The authors state that in the other cases which responded to P.U. the injection served to reactivate the ovaries and pregnancy followed subsequent services.

A number of cows showing regular oestrus but failing to conceive were treated with three i/m injections of 2 c.c. P.U. given at two-day intervals beginning on the day of service. The authors claim that this treatment increased the fertility of the cows affected with this condition. It is suggested that this type of sterility is often due (a) to failure to ovulate, and (b) to deficiency of progesterone following ovulation.

The i/v injection of such high doses of P.U. is not without danger. The authors record the death of one heifer following four i/m injections and one i/v injection of P.U.; it is possible that death was due to anaphylactic shock.

In three bulls with temporary infertility, fertility was apparently restored by two i/m injections of 2 c.c. P.U. given at four-day intervals.—N. J. Scorgie.

Larson, C. E. (1940). **Use of Sodium Hexametaphosphate as an Anticoagulant.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 554–555.

The mechanism by which sodium hexametaphosphate reduces Ca ion concentration is discussed. The effect of this compound on the clotting time of blood was investigated and the results indicate that it is an efficient anticoagulant which may have certain advantages over existing agents.—R. Allcroft.

POISONS AND POISONING

WORDEN, A. N. (1940). **The Toxicity of Laevulose Cyanhydrin, together with General Observations on Cyanide Poisoning.**—*Vet. Rec.* **52.** 857–865.

HCN destroys vermin and arthropod pests and is useful as a fumigant for large consignments of foodstuffs. The risks to the consumer have been considered particularly in the case of foodstuffs containing laevulose, such as dried fruits, which may retain HCN owing to the formation of laevulose cyanhydrin. The approximate MLD of the latter for rabbits was 0·1 g. and for a dog weighing 23 kg. it was 1·5 g. The effects produced by any given quantity of cyanhydrin depend upon the rate of absorption into the blood and the rate of elimination, and experiments showed that the actual dose absorbed after any one meal is the important factor. Sublethal quantities are quickly disposed of without ill-effect, and relatively large quantities can be consumed if spread over several years. A fatal or non-fatal issue is determined by the rate of absorption into the blood in relation to elimination and to the rate of detoxication within the body. Laevulose cyanhydrin dissociates within the alimentary tract of the rabbit and dog into laevulose and toxic HCN, and not into the non-toxic hydroxy acid and ammonia. The findings are discussed in relation to alleged cases of HCN poisoning of plant origin and in particular to those ascribed to the feeding of linseed cake.—R. B.

SMITH, R. G., MUKERJI, B., & SEABURY, J. H. (1940). **Thiocyanate Formation in Cyanide Poisoning as Affected by Methylene Blue and Sodium Nitrite.**—*J. Pharmacol.* **68.** 351–364.

During recent years both methylene blue and sodium nitrite have been utilized as antidotes in experimental and even in clinical cases of cyanide poisoning. $NaNO_2$ has been held to act by virtue of the formation of methaemoglobin, the latter in turn forming the comparatively stable cyanmethaemoglobin, from which cyanide is liberated at a sufficiently slow rate for the body to detoxicate it. Some workers believe that methylene blue acts in an identical fashion, while others attribute its action to its ability to function as a respiratory catalyst.

Dogs were injected intravenously with sublethal doses of NaCN (1 mg. per kg. body weight in N/10 solution administered over a period of 5 min.). Respiratory and other symptoms followed, but these could be relieved quickly by intravenous injection of 20 mg. per kg. of a 2% solution of $NaNO_2$ or of 10 mg. per kg. of 1% methylene blue. Either antidote injected before the cyanide prevented all but minor manifestations, although both $NaNO_2$ and methylene blue themselves sometimes produced vomiting or other symptoms. A less extensive series of experiments was conducted with rabbits.

The changes in the serum concentration and in the urinary excretion of thiocyanate were studied. As determined by Härtner's method, the serum thiocyanate (as SCN) of 17 normal dogs ranged from 53–184 μg. % with an average of 111 ± 37 μg.%. In rabbits the corresponding average value was 42 μg. %. Administration of cyanide resulted in a rapid increase in serum SCN, which was more marked in the case of the rabbit. $NaNO_2$ administration caused an initial depression of this increase, especially in the dog, while, in the case of the rabbit only, methylene blue stimulated SCN formation. Recovery of cyanide as SCN was more rapid in the rabbit. The species differences are discussed in relation to these results and to those of other workers, and it is concluded that although SCN formation is less marked in the dog, it is at least comparable in significance to that which occurs in the rabbit. (Increases up to about 300% were obtained two hours after injection of the cyanide.) It was not possible to draw definite conclusions as to the modification of SCN production by either antidote.—ALASTAIR N. WORDEN.

MARTIN, J. H., COUCH, J. F., & BRIESE, R. R. (1938). **Hydrocyanic Acid Content of Different Parts of the Sorghum Plant.**—*J. Amer. Soc. Agron.* **30.** 725–734.

The HCN content of different parts of the sorghum plant was determined by a modification of the Liebig titration. The leaves were found to contain from 3–25 times as much HCN as the corresponding stalks of plants which had reached the boot stage, and the following relative distributions of HCN were noted :– upper (younger) leaves > lower (older) leaves ; proximal half of leaves > distal half ; leaf blades > midribs ; upper stalk internodes > lower internodes ; side branches > main stalk, and, in most cases, suckers > main stalks. There is thus a close correlation between the age of a part and its HCN content, the

younger parts containing greater quantities. —Alastair N. Worden.

Poole, A. L., & Cairns, D. (1940). **Botanical Aspects of Ragwort (*Senecio jacobaea* L.) Control.**—*Bull. Dep. sci. industr. Res., N.Z.* No. 82. pp. 61.

Ragwort is extremely widespread in New Zealand, particularly in the North Island central plateau; it spreads rapidly and unless checked will cover whole pastures in a few years, causing great loss to farmers, especially dairy farmers. This bulletin suggests various methods for its control, including deflowering, cutting, pulling, and control by the grazing of sheep; this latter is the only effective method with very badly infested farms, as in such cases the cost per acre of the mechanical methods becomes prohibitive. The best results with sheep control have been obtained when the land has been heavily stocked with sheep when the ragwort was in full flower; the sheep eat all the flowers off, strip the plants of foliage and chew all but the tougher flowering stalks down to the ground. It is essential, however, that sheep should not be kept too long on the plants or given too much ragwort as the poisonous principle is cumulative. Once sheep have acquired a taste for ragwort they will eat the plants all the year round, thus preventing any seed from falling on the pastures.

Andreoni, R. (1938). Azione di alcuni aggressivi lacrimogeni sul cavallo e sul cane. [**Action of Various Tear Gases on Horses and Dogs**].—*Clin. vet., Milano.* **61.** 451–454.

The effect of tear gas on animals is very slight; in A.'s experiments only heavy concentrations of bromobenzyl cyanide, chloracetophenone, and bromacetone affected them, and the symptoms disappeared as soon as the animals were removed from the vicinity. The gases affected only the larynx.

PHYSIOLOGY

Venzke, C. E. (1940). **A Histological Study of the Teat and Gland Cistern of the Bovine Mammary Gland.**—*J. Amer. vet. med. Ass.* **96.** 170–175.

The material for this study was provided by teats selected at random from cows throughout all stages of pregnancy, and from non-pregnant cows for comparison.

The skin and teat (streak) canal are lined with stratified epithelium, this being thicker in the former; but the cistern or cavity of the teat and the gland cistern (lactiferous sinus) present a two-layered epithelium. In old cows areas of epithelium in the cavity of the teat may be multi-layered. Structurally the teat consists of muscle fibres arranged in all directions supported by a connective tissue framework and interspersed with a vascular network and some nerve fibres. The cistern of the gland differs from that of the teat only in slight decrease of longitudinal muscle and increase of elastic fibres. In the heifer the circular muscle of the teat sphincter is poorly developed as compared with that of the mature or lactating animal. Small accessory glands are present within the tunica propria of the teat and gland. Each is complete with functioning alveoli and collecting duct. It seems reasonable to believe that milk is secreted by these glands.—C. W. O.

Trautmann, A., & Kirchhof, H. (1939). Beziehungen der Milchdrüse zu den Ovarialhormonen (Oestruzyl) und dem laktotropen Hypophysenhormon. [**The Reaction of the Udder (Goat) to the Ovarian Hormone (Oestruzyl) and to the Lactotrophic Pituitary Hormone**].—*Dtsch. tierärztl. Wschr.* **47.** 654–658.

The administration of prolactin to young goats stimulates milk secretion provided there is some development of the mammary gland. In milking goats prolactin increases the milk production. Inconclusive effects were obtained with "oestruzyl" [an unstandardized total ovarian extract which probably has little biological activity].—J. M. Robson.

Heller, H. (1940). Versuche mit der Cuboni-Reaktion zur Trächtigkeitsfeststellung beim Schwein. [**Cuboni's Pregnancy Test in Pigs**].—*Wien. tierärztl. Mschr.* **27.** 364.

Experiments on 15 gravid sows and four non-gravid controls indicated that the Cuboni test as described for use on mares, *i.e.* detection of ovarian hormone in urine, was not suitable for determination of pregnancy in pigs, even in advanced stages.—H. H. Green.

Wegner, M. I., Booth, A. N., Bohstedt, G., & Hart, E. B. (1940). **The "in vitro" Conversion of Inorganic Nitrogen to**

Protein by Microorganisms from the Cow's Rumen.—*J. Dairy Sci.* **23.** 1123–1129.

The authors have previously shown that calves are able to use inorganic nitrogen in the form of urea and NH_4HCO_3 as substitutes for part of the protein in the ration. The most probable explanation given for this is the production of protein from inorganic N by bacteria in the rumen, and later digestion of these bacterial cells in the fourth stomach and intestines. In a series of *in vitro* experiments with synthetic media in which the conditions were designed to approach as closely as possible to those in the rumen, it was demonstrated that the conversion of inorganic N could occur through the use of bacteria from the cow's rumen. Bacterial activity, and hence conversion, was dependent on the pH of the media, the optimum range being 5·5–7·0. The carbohydrates (maize molasses, glucose, and starch) used in the media were of equal efficiency as sources of energy for the organisms used, but cellulose was useless. In the course of the experiments, amylolytic activity of rumen liquid was demonstrated; there was only slight activity in the saliva. Cow's saliva was found to have no proteolytic activity.

—N. J. Scorgie.

Lardy, H. A., Pounden, W. D., & Phillips, P. H. (1940). **H ion Concentration of Various Fluids of the Genital Tract of the Cow.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 517–519.

The following fluids were obtained either during life or immediately after slaughter, and their pH values determined by means of a glass electrode apparatus, with results as stated in parenthesis :– vaginal douche (6·0–6·7), cervical fluid (7·6–8·9), distilled water washed through uterus (6·6–7·2), amniotic fluid from calf foetus (7·0–7·4), and follicular fluid (7·5–7·7). It is noted that the average pH of the uterus, 6·8, is identical with that previously found to be optimal for the storage of bull semen. The alkaline reaction of the bovine vagina during oestrus is in contrast to the acid reaction described as occurring in the case of the rat vagina. The implication of these findings in relation to vaginal douching is discussed.

—Alastair N. Worden.

Koopmans, S. (1939). De bloedvoorziening van de hersenen. De invloed van de halssympathici en de halsvagi. **[The Blood Supply of the Brain].**—*Tijdschr. Diergeneesk.* **66.** 389–398. [English, French and German summaries].

Since the work of Bernard (1858) on the innervation and blood supply of the brain, many physiologists have reported contradictory results on the subject. K. studied the influence exerted by the cervical sympathetic and vagus nerves upon the cerebral blood vessels. He describes experiments carried out by means of plethysmography on anaesthetized cats. It was found that the right sympathetic nerve contains vasoconstrictors for the brain, as does the left sympathetic nerve in 30% of cases although in the other 70% the left nerve is divided into a thin and a thick fibre. Only the thick bundle contains vasoconstrictors. Stimulation of the thin fibre produces dilatation of the vessels and fall of the general arterial blood pressure. The vasoconstrictors maintain the tonus of the cerebral vessels. The vagus nerves of both sides contain dilatators for the brain. In some cases the influence of these dilatators upon the tonus was established.

K. failed to demonstrate the presence of synapses in the vasomotor nerves in the cervical ganglia of the vagus and sympathetic nerves. Six graphs show the various reactions of the vessels after excitation of the nerves.—L. T.

Romanes, G. J. (1940). **The Spinal Accessory Nerve in the Sheep.**—*J. Anat.* **74.** 336–347. [Author's summary copied *verbatim*].

(1) Descriptions of the macroscopic arrangement of the spinal accessory nerve in the sheep are given, with special reference to its relationship to the cervical spinal nerve roots.

(2) Two distinct stages of medullation exist in the spinal accessory nerve. (a) Fibres from the motor nucleus of this nerve are already well medullated in a 78-day-old sheep foetus. (b) A second set of fibres connecting the spinal accessory nerve with a longitudinal tract, visible as a caudal continuation of the solitary tract in premyelin stages, begins to medullate in an 84-day-old sheep foetus and reaches adult medullation by the 124th day of foetal life, by which time it shows a medullated continuity with the solitary tract not previously visible.

(3) Ganglionic cells of a sensory type have been demonstrated on the intradural part of the spinal accessory nerve and on one or two of its more cephalic rootlets.

(4) It is suggested that the spinal accessory nerve of the sheep is a mixed nerve whose medullation is precocious. It appears to be

related to the visceral rather than to the somatic cell columns, as suggested by its connexions with the solitary tract and the close relation between its motor nucleus and the nucleus ambiguus.

RAPOPORT, S., NELSON, N., GUEST, G. M., & MIRSKY, I. A. (1941). **The Turnover of Acid-Soluble Phosphorus in the Kidneys of Rats.**—*Science.* **93.** 88–89.

To investigate the possible connexion between the P metabolism of the kidney and the mechanism of glucose reabsorption, the influence of phloridzin on the exchange of P in the kidney was studied in rats, using radioactive P as an indicator. The P fractions were determined in trichloroacetic acid extracts of the kidneys which were removed 30 min. after injection of the radioactive P and 45 min. after phloridzin injection. Control animals were treated similarly except that sodium bicarbonate instead of phloridzin was injected. In the kidneys of the phloridzinized rats the turnover of the pyrophosphate fraction was decreased while the other fractions of the acid-soluble P determined were apparently not affected. This indicates that phloridzin exerts *in vivo* an inhibitory effect on some phases of the phosphorylating mechanisms of the kidney. From these results it is concluded that the blocking of glucose reabsorption is due to an inhibition of phosphorylating processes in the kidney.

—R. ALLCROFT.

GREENBERG, D. M., & CAMPBELL, W. W. (1940). **Studies in Mineral Metabolism with Aid of Induced Radioactive Isotopes. IV. Manganese.**—*Proc. Nat. Acad. Sci.* **26.** 448–452.

Radioactive Mn, produced by the bombardment of Fe with deuterons, was used as a " tracer " element in studies on the metabolism of Mn. One rat was given 1 mg. labelled Mn (as the chloride) by stomach tube and another received 1 mg. injected intraperitoneally. Faeces and urine were collected separately and after 75 hours the animals were killed and the tissues examined for radioactive Mn. In both cases over 90% of Mn was excreted within this period through the faeces, but very little, if any, of the absorbed Mn was found in the urine. Liver, bone, and muscle were the principal organs to take up Mn in appreciable quantities, but other tissues also stored or helped to excrete varying amounts of Mn.—A. EDEN.

HAHN, P. F., BALFOUR, W. M., ROSS, J. F., BALE, W. F., & WHIPPLE, G. H. (1941). **Red Cell Volume Circulating and Total as Determined by Radio Iron.**—*Science.* **93.** 88–89.

It has been shown that administration of radioactive iron to the anaemic dog by mouth or vein enables a record to be made of the rapid construction of new haemoglobin which contains the radio-iron within the newly formed cells [see *V. B.* **10.** 798]. These red cells are marked or labelled by the isotope and do not give up this iron until the cell breaks up. It is now shown that by intravenous transfusion these labelled red cells can be used to determine the circulating mass of red cells in another dog whose cells contain none of the isotope. The red cell mass in circulation, determined by this method averages about 75% of the value as computed by the jugular haematocrit from the plasma volume (dye method). The red cell volume as measured by dilution of the injected labelled red cells was found to be almost the same after ten minutes as after 1–3 days; average differences between these two values were only about 3%. This indicates that in the usual healthy dog the number of immobilized red cells in marrow, spleen, and other vascular spaces does not exceed 10% of the circulating mass and may be considerably less.

It is suggested that if a suitable donor with a large mass of red cells containing radio-iron is available, this method may be used to study normal and abnormal physiology and some interesting observations may be made on shock, polycythaemia, circulatory failure, and other abnormal states.—R. ALLCROFT.

I. MEIROWSKY, E. (1940). **A Critical Review of Pigment Research in the last Hundred Years.**—*Brit. J. Derm.* **52.** 205–217.

II. ANON. (1940). **Melanin.**—*Lancet.* **239.** 109–110.

I. Since the initiation in 1837 of research on the melanotic pigment of the skin, general agreement has been reached on only a few points. M. reviews these results and considers from what point future research must be restarted. One of the central problems in skin pigment research is the origin and significance of the dendritic cells, and it may be regarded as an established fact that the dendritic cells have not immigrated from the corium and are not nerve cells but are modified epithelial cells. Observations indicate that melanogenesis takes place not only in the dendritic cells but also independently in the cells of the Malpighian

layer. The question of whether the dendritic cells merely manufacture pigment or whether they have other functions and are anatomically different from the ordinary cells of the epidermis is discussed ; M. is of the opinion that they have functions other than the manufacture of pigment. Concerning the transport of the pigment from the skin it was early discovered (1889–1908) that even in the epidermis, pigment migrates from the cells to the lymph spaces, and later experiments (1923) showed that the higher and lower lymph spaces of the corium are filled with pigment, and only exceptionally was pigment found in the connective tissue cells. The nature and origin of the corium pigment and the nature and significance of the dopa (dihydroxyphenylalanine) reaction are discussed. The dopa reaction is positive chiefly in the dendritic cells of the basal layers and very seldom in the non-dendritic cells of the Malpighian layer and it appears that this reaction does not show all melanogenic cells ; thus a negative dopa reaction is no certain proof that cells cannot form melanin, nor does a positive reaction justify the conclusion that a cell is capable of melanogenesis. The dopa reaction in a vitally stained specimen is not specific, and M. considers that it can only be an expression of an unspecific polyphenyloxidase present in the reacting cells. Other data also show that the enzyme in skin extracts is unspecific. Consideration of the chemical precursors of melanin shows that adrenalin or its oxidation products may be important as forerunners of melanin. It has been shown that those cells which naturally produce melanin provide their own pro-pigment and it is generally agreed that the nucleus is the progenitor of melanotic pigment.

II. In spite of much chemical investigation the exact formula of melanin is unknown, but it is thought to be related to tyrosine and adrenalin. It occurs in the skin in the form of microscopic granules, varying in tint from light brown to black, and contains no iron. It is known that in certain lower animals melanins are produced by the action of specific oxidases on tyrosine, and this fact led Bloch (1917–1927) to regard dopa (dihydroxyphenylalanine) as being almost identical with the pro-pigment which is eventually converted by oxidases to melanin in human skin, but dopa has never yet been isolated from the skin. The observations and conclusions expressed by Meirowsky [see I] are discussed in an annotation.—R. A.

TECHNIQUE AND APPARATUS

Zimmermann, A. (1939). Demonstration neuer Nährböden als Ersatz für Agar. **[Demonstration of New Culture Media as Substitutes for Agar].**—*Zbl. Bakt. I. (Orig.).* **144.** *65–*71.

Various substitutes for imported agar were discussed, and demonstrations given of plates prepared with hardened gelatin, polyvinylalcohol, cellulose, and starch. Satisfactory results were obtained with starch itself, or starch associated with blood, Endo's medium, brilliant green, malachite green, and media suitable for acid fast organisms. Types of colony growth with *Bacterium coli*, the typhoid and paratyphoid bacilli, and *Pseudomonas pyocyanea* on starch medium are illustrated by sketch.—H. H. Green.

Khairat, O. (1940). **The Effect of a CO_2 Atmosphere on Blood Cultures.**—*J. Path. Bact.* **50.** 491–496.

The germination and growth rate of various organisms obtained from routine blood cultures were compared when primary cultures were grown aerobically, in air containing 5% CO_2, and anaerobically. 5% CO_2 enhanced the growth rate of all the organisms studied with the exception of *Salmonella typhi* and *Haemophilus influenzae*, and enabled a new species of *Haemophilus* to be isolated. The value is emphasized of incubation in air plus 5% CO_2 in routine blood culture work.—J. A. N.

Nitzulescu, V. (1939). Notices de techniques parasitologiques. **[Notes on Parasitological Technique].**—*Vol. jubil. Prof. Sadao Yoshida.* **2.** 655–658. Osaka : Osaka Natural History Society. [In French].

A microdissection needle can be very simply made from a fine entomological mounting pin and a pair of artery forceps. The forceps should be short and rather broad, so that they fit comfortably into the hand of the manipulator. A small piece of paper is pleated finely, the head of the pin is laid along one of the folds, and the whole is clamped between the jaws of the forceps. The pin can be changed whenever it is damaged in any way.

A cell in which very small objects can be

dehydrated, cleared, and embedded, is constructed by fixing a glass ring, such as is used for hanging drop cultures, to a slide by means of liquid sodium silicate. The various changes of liquid are effected by means of a very fine pipette, without the necessity of transferring the object itself. When the impregnation is accomplished, the object may be orientated as required, and then the whole preparation plunged into water. The sodium silicate dissolves away, letting the slide separate from the ring, and the paraffin block can then be easily removed. Any operations requiring the use of an aqueous medium can be performed in a similar cell, set with paraffin in place of the sodium silicate.—E. S.

BELLIS, C. J. (1940). **A Rapid Method for Determining Specific Gravity of Body Fluids by the Falling Drop Principle.**—*J. Lab. clin. Med.* **26.** 564–567. [Author's summary copied *verbatim*].

A successful experience with the Barbour and Hamilton falling drop method for determination of plasma, serum, or whole blood specific gravity is reported. A table is presented for use in the rapid determination of the specific gravity, and a second table is given for obtaining the serum protein concentration when the specific gravity is known. The advantages of these are mentioned, and some indications for their employment are cited.

LILLIE, R. D. (1940). **Further Experiments with the Masson Trichrome Modification of Mallory's Connective Tissue Stain.**—*Stain Tech.* **15.** 17–22. [Author's abst. copied *verbatim*].

Several dyes, notably ponceau 2R, azofuchsin 3B, nitrazine yellow, and Biebrich scarlet may replace imported " ponceau de xylidine " in the Masson ponceau acid fuchsin mixture. Of these Biebrich scarlet appears to be the best and may be used without acid fuchsin.

A mixture of equal parts of 5% solutions of phosphomolybdic and phosphotungstic acids is much superior to either acid alone and gives adequate mordanting in 1 minute at 22°C.

With the fast green modification, times in plasma and fiber stains can be reduced to 2 minutes each. With anilin blue a 4-minute plasma stain is required. One-minute final differentiation in 1% acetic acid is adequate.

Primary mordanting of formalin material may be accomplished by 5 minutes in saturated aqueous mercuric chloride or 2 minutes in saturated alcoholic picric acid. Three minutes washing in running water is required after these mordants.

FRANCIS, T. (1940). Methode zur Orientierung der in Paraffin eingebetteten Objekte. **[Method of Orientating Objects Embedded in Paraffin].**—*Acta path. microbiol. scand.* **17.** 100–103. [In German].

F. orientates the tissue in the melted paraffin in a porcelain vessel with the aid of a dissecting microscope, the vessel being placed on a ledge of copper sheet which is heated by a bunsen burner sufficiently to keep the wax fluid. As soon as the manipulation is finished the wax is cooled by immersion in a water bath placed underneath the porcelain vessel and gradually raised so as to avoid disturbance of the tissue. —J. E.

MISCELLANEOUS

CARMICHAEL, J. (1940). **Veterinary Education in Uganda.**—*Overseas Education.* pp. 126–129.

In this article the case is presented for higher education of Africans as veterinarians. C. relates the progress being made in Uganda to attain this object. The present course of study covers a period of five years. The first two years are spent at Makerere College in conjunction with medical and agricultural students, the subjects studied being biology, chemistry, physics, English, and mathematics. The veterinary students then carry on their studies for three years of professional training at the veterinary laboratory at Entebbe. So far the veterinary course has not attracted the same numbers of students as the medical and agricultural classes; this is believed to be due to the less attractive nature of the veterinary officer's work from the African's point of view. The use of Africans as veterinarians is economically a necessity so that animal disease may be controlled without overtaxing the financial resources of the country. Larger staffs of trained men are required and this will only be possible when Africans can replace Europeans in executive positions. [Well-educated Africans, who have received technical training, have been given executive posts in the various departments of the colonial service for

many years. Professionally qualified African officers are also employed in the legal, medical, public works, survey, and education departments in the West African colonies but, so far, no African veterinary surgeon has been appointed.]—J. A. GRIFFITHS.

CHRISTENSON, I. (1940). Veterinärens nutida möjligheter att skydda sig själv och sina patienter från infektion under sjukvårdsarbetet. **[Modern Clothing and Equipment to Protect the Veterinary Surgeon and His Patients from Infections While at Work].**—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 409–436. Discussion pp. 436–442. [English summary].

This is an illustrated lecture on protective clothing for veterinary surgeons and on disinfection of clothes and instruments. C. recommends the use of pure rubber overcoats or overalls with short or long sleeves, short or long rubber gloves, rubber overboots reaching half way up the tibia, hood or cap and celluloid visor—to be used in various combinations for obstetric work, diagnosis of TB., foot and mouth disease inspections, etc. Advice is given on the disinfection and care of these objects and of instruments, and reference is made to cases of transmission of TB. and brucellosis between animals by veterinary surgeons who had omitted to disinfect their equipment.—J. E.

KAY, H. D. (1941). **Some Recent Advances in Dairy Science.**—*Nature, Lond.* **147.** 42–45 and 75–78.

K. lists the following as the main causes of low quality milk :– udder disease, even in the subclinical stages; feeding of insufficient supplementary food, particularly in late summer; breed differences; physiological disturbances, unassociated with disease in the ordinary sense, and probably due to hormone imbalance; and adventitious watering.

The principal cause of inferior quality milk is stated to be mastitis, usually due to *Streptococcus agalactiae*. K. mentions an investigation carried out in 29 herds, in which mastitis was found on bacteriological examination in at least 61% of the animals which yielded low quality milk. Loss from mastitis due to reduced milk yield has been estimated at £2,500,000 annually in Great Britain, in addition to loss due to diminished quality and nutritive value.

With regard to healthy and well-fed cows which are producing low quality milk, K. mentions certain experiments which have demonstrated that it is possible to increase both the quantity and quality of the milk by the administration of hormones.

K. stresses the importance of the phosphatase test for determining the efficiency of the pasteurization process.

With reference to the destructive effect of pasteurization on the nutritive quality of milk, it has been shown that commercial pasteurization results in no change in the vitamin A content, causes less than 20% destruction of vitamin B, and about 20% of vitamin C. K. regards this loss of vitamin C as of doubtful importance in human nutrition, since cow's milk is in any case a poor source of this vitamin.

With relatively few exceptions the quality of cow's milk remains largely unaffected by diet. The exceptions are vitamins A and D and riboflavin, which have been shown to depend on the nature of the diet.—N. J. SCORGIE.

—. (1940). **Report of Committee on Veterinary Biological Products.**—*J. Amer. vet. med. Ass.* **97.** 506–507.

An outline of the committee's work since 1927 is given. Seventeen biological products have in the past been classified as " acceptable ", and seven further products are now added to the list. These products are all standardized and issued under agreement with the Bureau of Animal Industry.—J. E.

I. GORRIE, R. M. (1938). **The Problem of Soil Erosion in the British Empire with Special Reference to India.**—*J. R. Soc. Arts.* **86.** 902–924. Discussion pp. 924–926. [Reprinted in *Agric. Live-Stk India.* **9.** 167–186. (1939)].

II. FIENNES, R. N. T.-W. (1939). **Soil Erosion and Agricultural Planning.**—*Uganda J.* **6.** 137–147.

I. The causes of soil erosion are discussed and attributed to bad methods of cultivation and overstocking. With regard to overstocking G. quotes BECKLEY as saying with regard to Kenya :–

" Aggravating the whole situation is the increasing stock population; cattle are increasing in numbers but diminishing in size, sheep are multiplying while the pestilential goat seems to be progressing in geometrical proportion, often dominating the stock population and destroying more than it uses. If the native cannot learn to differentiate between quality and quantity and to regard wealth as something more than herds of diminutive cattle and flocks of the infernal goat, one must agree with the Director of Amani and regard excess native stock as one of the major pests of Africa and more dangerous than locusts."

II. F. defends the stock population (includ-

ing the " pestilential goat ") from the above and other attacks, and points out that, at any rate in Uganda, overstocking is not in itself responsible for the soil erosion, but that it does finish what has already been begun by bad methods of cultivation. These methods have rendered the land unsuitable for further crops, and the land has been given over to grazing, thus giving the impression that the cattle are responsible for the serious progressive erosion. Furthermore he points out the place of stock in land reclamation, and describes a system of paddocking whereby the land can be enormously improved if undertaken hand in hand with the development of water supplies.

[See also *V. B.* **11.** 486.]

JORDAN, P. (1939). Die Stellung der Quantenphysik zu den aktuellen Problemen der Biologie. (Uebersicht). [**The Place of the Quantum Theory in the Problems of Biology**].—*Arch. ges. Virusforsch.* **1.** 1–20.

A speculative review unsuitable for abstracting, which should be read in the original by those sufficiently versed in molecular physics and in microbiology to appreciate the argument in relation to the literature discussed. The relationship of modern theories of atomic structure and the activation of molecules by wandering of electrons are considered in respect to biochemical changes in living cells and to the effect of radiations on biological behaviour, including phenomena such as mutation and denaturation of viruses, and gene mutation in *Drosophila*. Definite structures of microphysical dimensions are predicated which act as directional organs and induce biological reactions by summation of single quanta of energy.—H. H. GREEN.

OFFICIAL AND OTHER REPORTS

GREAT BRITAIN. (1940). **Report of the Governing Body of the Lister Institute of Preventive Medicine, 1940.** pp. 21. London: Lister Institute of Preventive Medicine. [4to].

VIRUS DISEASES.—Research on VACCINIA included studies by MCCLEAN and HENDERSON who completed their investigation of the immunity following intracutaneous and subcutaneous injection of elementary body suspensions of vaccinia virus. The results indicated that in man, with strains of vaccinia virus in common use, immunity is not established unless a typical cutaneous vesicle develops. Comparable immunization experiments performed on rabbits showed that vesicle production is not of importance, thus indicating that there is a difference between the nature of the immune response of rabbits and of children. Cultivation of various strains of vaccinia virus on the chorio-allantoic membrane of the developing chick was also studied. Bacteria-free suspensions of CONTAGIOUS PUSTULAR DERMATITIS have been prepared by the same methods as those employed for the preparation of vaccinia virus E.B. suspensions. Attempts to cultivate this virus on the chorio-allantoic membrane of the chick embryo have not been successful. The soluble specific substance of vaccinia virus was investigated by RECORD, and further work on the chemical nature and enzymic activity of the virus was carried out by M. G. MACFARLANE and DOLBY. Physical investigation on the E.B. of vaccinia by A. S. MCFARLANE and co-workers are reported [see also *V. B.* **11.** 29.]

SEROLOGICAL STUDIES.—Experiments were carried out on mice affected with *Clostridium septicum* and *Cl. welchii* to test the value of sulphapyridine and sulphanilamide as therapeutic agents alone and in combination with sera. Sulphapyridine was the most effective drug, but the time of administration and the route of the infection were found to influence the effectiveness. It is thought that combined serum- and chemotherapy may result in a greater survival rate than that obtained by the use of chemical agents alone. Mention is made of the preparation of TYPHOID antiserum from horses using acetone-dried and killed bacilli. An advantage of this method is that the horses remain in good condition and can withstand at least three full courses of immunization. The effect of temperature on the stability of antisera was investigated by AMIES who found that TETANUS antitoxin is not appreciably affected by being maintained for three weeks at –16°C., or by repeated freezing and thawing. A mouse protection test for determining the potency of anti-meningococcus sera has proved very satisfactory. Recent work on the titration of TETANUS antitoxins has shown that, despite the accuracy with which assays can be carried out

in the mouse and ĝ. pig, the values assigned to samples of antitoxin in different laboratories may vary widely.

Biochemical Studies on Antigens and Antibodies.—These studies were continued by Morgan and Partridge, and an investigation of the nature of the amino sugars present in certain bacterial antigens resulted in the elaboration of a method for the isolation of small quantities of glucosamine and chondrosamine. Certain problems concerned with the concentration of immune sera are being investigated by the Biochemical Department.

Physico-Chemical Investigations.—Kekwick continued investigations on sera from cases of multiple Myelomatosis and it appears that two types of divergence from the constitution of normal serum occur. In collaboration with Amies, Knight, and Record, antitoxic sera, including those prepared from *Corynebacterium diphtheriae*, *Cl. tetani*, and *Cl. welchi* were compared electrophoretically with normal horse serum and marked divergences were found. The changes during the course of immunization with diphtheria toxin have been followed with the ultracentrifuge and electrophoresis apparatus and the results from the latter correlated with Ramon flocculation studies carried out by Record. It has been established that both the β and γ globulins are associated with antitoxic activity and these components, isolated electrophoretically, show characteristic properties with respect to the Ramon test, and also with regard to the *in vivo-in vitro* ratio. Studies on flocculation tests with toxins and antitoxins are proceeding and the possibility of using the flocculation test as a means of supplementing the *in vivo* test for the preliminary measurement of units of toxin and antitoxin is being investigated by Eagles.

General Bacteriological Studies.—Klieneberger and Steabben recorded the isolation of a " pleuro-pneumonia-like " organism from the purulent Broncho-Pneumonia so common among laboratory rats ; study of the " pleuro-pneumonia-like " organisms is being continued by Klieneberger. Serological studies on *Trichomonas foetus* and *Eutrichomastix colabrorum* were continued by Robertson with the object of facilitating the diagnosis in cattle of this type of infection.

Factors Which Increase Tissue Permeability.—McClean has confirmed an observation by Chain and Duthie that purified fractions of the diffusing factor from mammalian testis show marked mucolytic activity, and has shown that purified diffusing factors obtained from various bacterial filtrates have a similar mucolytic activity ; this activity is inhibited by anti-diffusing sera. The evidence now available suggests that these mucolytic enzymes and the corresponding diffusing factors are identical. [For symposium on diffusing factors see *V. B.* **11.** 381–385.]

The Chemistry and Physiological Reactions of Phosphoric Esters.—Further studies of the chemistry of carbohydrate-phosphoric esters and of the physiological processes in which they are concerned were made by Robison and Tazelaar.

Metabolism of Fat.—[For a report on a part of this section of the work see *V. B.* **11.** 46.] A study of the turnover of phospholipins, measured by means of radioactive phosphate in rats starved of fat but with a plentiful supply of carbohydrate, indicated that the formation of fatty acids from carbohydrate and its incorporation into phospholipin seem to be as efficient in the fat-starved as in the normal rat. The effect of the essential unsaturated acids seems therefore to be concerned not with the formation of the fatty acids but with their subsequent utilization in the body.

Studies on Kidney Function.—By the use of colour photography in a modified method of intravital microscopy the mechanism of the acidification of urine in rats and frogs was studied. Acidification was found to take place in the proximal as well as in the distal tubules if the urine is strongly acidified and only in the latter if the urine is less acid. The acidification occurs probably by absorption of alkali in both sets of convoluted tubules.

Studies on Tumour Transplantation.—Studies on the antigenic basis of tumour transplantation were continued by Gorer. The susceptibility to inoculation of leucaemic cell suspensions originating from a case of myeloid Leucaemia, was studied genetically. The results indicated that at least two factors were essential for the growth of the leucaemic cells. Serological tests showed that the leucaemic cells contained two distinct antigens and if either of these were absent from the normal tissues of any host, the cells were destroyed and antibodies directed against one or both of these antigens were usually demonstrable in the sera of immune animals. Investigation on the incidence of liver tumours in a pure line of mice showed that males of Strong's CBA strain are far more susceptible than females.

Endocrinology.—Experiments on the co-

operative and antagonistic activities of sex hormones on different organs were continued by KORENCHEVSKY, including investigations on their role in connexion with tumour development, formation of cysts in the ovaries, and pathological changes in the kidneys. LEDINGHAM has recently shown that the numbers of Foà-Kurloff cells in g. pig blood are definitely regulated by hormonal impulses proceeding from the sex organs.

VITAMIN STUDIES.—Work on vitamin standardization has been continued in preparation for the League of Nations International Conference when it is possible to hold meetings. A modification in the biological test for estimation of vitamin A was introduced by HUME and further work on the vitamin B_2 complex was carried out by various workers [see *V. B.* **10.** 956]. Porphyrin excretion and study of the localization of vitamins by fluorescence microscopy was continued by ELLINGER. The vitamin C requirements in fever were investigated by ZILVA and the results do not suggest that the vitamin C requirement of the g. pig is higher in fever than under normal conditions. Other work on vitamin C included the photochemical decomposition of the vitamin, influence of vitamin C on the respiratory capacity of the tissues, the preservation of ascorbic acid in urine, and the enhancement of the vitamin C content of meat and vegetable rations. The vitamin E colony of rats was maintained during 1939 by COPPING for testing the activity of synthetic tocopherol preparations. The results showed that administration of single doses of 1·8 mg. induced successful gestations in the prepared depleted female rats while doses of 1·3 mg. failed to do so.—R. ALLCROFT.

GREAT BRITAIN. (1939). **Annual Report of the Hannah Dairy Research Institute for the Year Ending 31st March, 1939.** [WRIGHT, N. C.] pp. 19. Kirkhill, Ayr: The Hannah Dairy Research Institute. [8vo].

The report is divided into four sections, *viz*, (1) general, dealing with staff and developments (2) research in progress, (3) finance, and (4) publications. Research on the following subjects has been carried out:– the protein requirements of dairy cows, the biochemistry of milk secretion, the genetics of dairy cattle, bovine contagious abortion, and bovine mastitis. The investigations on mastitis include work on a simplified diagnostic test and on the efficacy of chemotherapeutic agents, such as acriflavine, euflavine, and sulphanilamide compounds. The results of the work carried out have been published in bulletins, references to which are given in the report.—J. C. WALLACE.

INDIA. (1940). **Annual Report of the Imperial Veterinary Research Institute, Mukteswar, For the Year 1937-38.** [WARE, F.] pp. 67. Delhi: Manager of Publications. [8vo] [Re.1 As. 8 or 2s. 3d.]

GENERAL.—A number of appendixes give details concerning biological products (production and issue to the various States), conditions of sale of biological products (regulations), prices of biological products, specimens received for diagnosis, and finance.

SEROLOGY SECTION [KAURA, R. L.]—Cystein hydrochloride broth was used in place of Noguchi's medium in the routine manufacture of BLACKLEG vaccine. ANTHRAX spore vaccine is now used in all outbreaks. An outbreak of anthrax among 35 mules in which 19 died, was proved to be due to contamination of green fodder by infected soil. Out of 593 agglutination tests for *Brucella abortus*, 28% were positive. Coliform organisms were suspected of being a cause of BOVINE ABORTION in India. In one study in which EQUINE ABORTION was considered to be due to calcium deficiency, the use of a mineral supplement in the diet gave good results; also the Ca of the blood was restored to normal. In 101 aggln. tests of blood sera for infection with *Salmonella abortus-equi* and *Bacterium coli* (a strain isolated from equine abortion material), 58 were positive for *Bact. coli*, 16 positive for *S. abortus-equi*, eight positive for both, and the rest negative for both.

The antitoxin content of TETANUS antitoxin prepared at the institute was 200 I.U. per c.c. By using horse meat broth instead of beef broth, the M.L.D. of the toxin was reduced from 0·0003 c.c. to 0·0002 c.c. Concentration of tetanus antitoxin by precipitation has been carried out to prepare concentrated antibody, which is more suitable for therapeutic purposes.

There was failure in attempts to produce a vaccine to protect foals against PNEUMONIA due to *Corynebacterium equi* infection, a heat-killed culture being used. A non-mucoid variety of a non-pigmented diphtheroid suspected to be a rough variant of *C. equi*, was isolated from cases of NAVEL-ILL in calves; this proved non-pathogenic for three foals under one month of age, when inoculated by the intranasal route, and these foals resisted infection by a virulent strain of *C. equi* 14 days later; further work on

these lines is to be carried out.

RINDERPEST goat-tissue virus used alone in place of goat-blood virus on 74 calves of indigenous breeds of cattle and on five buffalo calves, gave no severe reactions; this was also the case with animals inoculated for the second year in succession, the reaction being only a temperature rise. The duration of the immunity after serum-virus inoculation was found to be solid after 6½–14½ years in three cattle and after six years in a cow. Immunity was also solid in four bulls 3½–4 years after vaccination with goat-blood virus. In tests on the viability of virus the strain of goat-spleen virus used, preserved in glycerin, was passaged 100 times at intervals of ten days, without loss of virulence. Goat-spleen virus was also found viable up to the 190th day, but not on the 215th day after storage, when preserved in 50% glycerin at 0·5°C. Goat-tissue virus issued to the field was found potent 7–9 days after transit under plains conditions. Rinderpest virus was recovered from an outbreak of the disease in sheep; this strain is being maintained by passage through bulls. The potency of serum and its protein content do not vary appreciably, whether buffaloes are immunized by a single injection of 1 c.c. or 5 c.c. of goat-tissue virus alone or by the serum-virus method, using 1 c.c. of bull virus and rinderpest antiserum in doses of 5 c.c. per 100 lb. body weight; the serum is equally potent whether there is a reaction or not.

EQUINE ENCEPHALOMYELITIS occurs in army horses and was also reported in non-military horses in Bihar. Analyses of fodders and concentrates from areas affected with E.E. showed gross imbalance of Ca and P; the serum of affected animals was also low in P.

A strain of the virus of CONTAGIOUS ECTHYMA of goats has been maintained by passage through goats. An ENCEPHALITIS of goats which was in epizootic form was studied. The specific lesions were seen in the brain and spinal cord.

PATHOLOGY SECTION [SHIRLAW, J. F.]—It is suggested that difficulty in diagnosis of JOHNE'S DISEASE by the use of avian tuberculin and johnin, may be due to clinical recovery which responds in the severe clinical phase to tests and gives no response at a later stage, even though there is extensive infection of the alimentary mucosa. Examination of faeces is considered a more effective means of diagnosis. TUBERCULOSIS was diagnosed in four cattle, two fowls, and one pigeon, the last case being due to avian type infection. In ENZOOTIC HAEMATURIA of cattle, the haemorrhage was found to occur from the bladder mucosa and also from the renal capillaries into the tubules of the kidneys; haemorrhagic lesions also occurred in other organs, the lungs and the liver in particular.

PROTOZOOLOGICAL SECTION [DATTA, S. C. A.]—D. is of the opinion that the organism which he previously named *Entamoeba kamala* [*V. B.* **9**. 486], associated with BOVINE HAEMATURIA, is a fungus and he proposes the name *Aspergillus kamala* n. sp. for it.

When cattle were inoculated intravenously with *Theileria annulata*, Koch's bodies appeared in the peripheral circulation within 14–21 days. The predilection site for multiplication of the parasite is generally in lymphoid tissue. The parasite is present in almost all organs, and infiltration with lymphocyte cells is a constant feature. The widely scattered haemorrhages which occur appear to be due to the endothelium of blood vessels being parasitized.

In an experiment, nymphs and adults of *Rhipicephalus sanguineus*, derived from larvae that had been fed on dogs artificially infected with *Babesia gibsoni*, were fed on four susceptible dogs; *B. gibsoni* appeared in the blood of these on the 10th and 14th days after the bite of the nymphs and five days later there was a rise of temperature; subinoculation of infected blood failed to transmit the disease to two susceptible dogs. No further symptoms were noted during an observed period of three months in four dogs.

The regular use of sugar and liver extract is recommended to minimize the toxic effects of arsenobenzene given in protozoan infections.

BIOLOGICAL PRODUCTS SECTION [HASSAN, S. R.]—Details are given of crops grown and animals kept for serum production; particulars of the dairy are also given. 700,000 doses of RINDERPEST antiserum were issued, 200,000 doses of HAEMORRHAGIC SEPTICAEMIA antiserum, 200,000 doses of BLACKLEG antiserum, and 46,000 doses of ANTHRAX antiserum.

ANIMAL NUTRITION SECTION [SEN, K. C.]—During the year this new section was being organized and work was begun on animal dietetics. It was shown that abortion and blindness in calves associated with vitamin A deficiency are widespread among livestock in India.—J. A. GRIFFITHS.

NEW ZEALAND. (1939). **Thirteenth Annual Report of the Department of Scientific**

and Industrial Research, 1938-39. pp. 134. Wellington: Govt. Printer. [fcp].

A taxonomic study of the BLOWFLIES of New Zealand and a survey of the flies responsible for strike throughout the country have been made. The seasonal sequence of blowflies has also been studied. The dominant and primary species are *Calliphora laemica* and *Lucilia sericata*. Under New Zealand conditions, the main cause of strike is dirty wool. *C. laemica* appears to be more important in the northern districts and *L. sericata* in the southern parts of New Zealand.

A study was made of the meteorological, soil, and pasture conditions associated with "FACIAL ECZEMA", in the hope of shedding fresh light on the nature of the disease.

Efforts to determine the cause of infertility in Romney rams were continued. Various nutritional measures failed to produce significant differences in groups of rams. A close relationship was established between the pH values of semen and its fertilizing power as determined by the percentages of conceptions following insemination. Fertility apparently increased with acidity, and in no instance did a sample of pH 7·0 or more prove fertile. It was found that an increase in acidity developed in semen after collection. This was most marked during the first half-hour, after which it slowed down considerably. This acid drift is associated with a diminution of the glucose and an increase in the lactic acid content of the sample. Further prospective experiments designed to elucidate the role of nutrition in sheep fertility are outlined.

Work has been continued at the Cawthron Institute on the cobalt status of South Island pastures, and figures are given for a number of districts. Further successes in the prevention and treatment of "BUSH SICKNESS" with cobalt are recorded.—LEWIS FITCH.

*NEW ZEALAND. (1940). **Report. Dairy Herd Testing in New Zealand, Herd Wastage and Investigations Work, 1939-1940 Season. Also Lifetime Merit Register (First Edition).**—*16th Ann. Rep. N.Z. Dairy Bd, 1939–40.* Reprint pp. 46.

MASTITIS.—In a report published by the Herd Testing Branch of the New Zealand Dairy Board, and compiled by the statistician, Mr. A. H. Ward, an indication is found of the position mastitis holds in dairy herds in New Zealand. On account of low production, 5·95% of all cows in 2,563 herds were culled; mastitis headed all diseases with a figure of 3·71% and sterility came next with 2·79%. Total wastage from all causes in this group of herds was 17·12%.

The figure 3·71% represented 21·7% of all cows culled. For different districts the wastage figure for mastitis varied from 18·2–24·5%. Wastage showed an upward trend with increasing age. A table showing mastitis wastage and the level of production of the cow is included. The peak culling occurs in herds giving an average of 200–239 lb. butter-fat. The lowest wastage occurred in the high producing herds of 320 lb. and over. A similar trend was shown in most districts in New Zealand.

STERILITY AND ABORTION IN DAIRY HERDS.—Out of 2,563 herds, the wastage figure for sterility for the 1939–40 season was 2·79%, representing 16·3% of the total wastage for the year. This figure differed greatly in separate districts from 9·4–20·6%. Sterility did not noticeably increase with age until after eight years, when culling did increase slowly. There was also a steady increase in sterility as production in the herd rose. Cows "empty" at the end of the season were 6·7%.

FERTILITY SURVEY.—Complete information of all matings was obtained from 90 herds, and a detailed examination made of semen from bulls used in 45 of these herds. 65% of cows held to first service and 22·6% to second. In a table showing the average number of services per conception, one herd of 43 cows gave a figure of 1·1 services per conception. A satisfactory figure was 1·6 services per conception. The figure, however, was over 2·2 services per conception in four herds.

The size of the herd was shown to have no connexion with the average number of services per conception; bulls over seven years old were not as fertile as younger bulls; the age of the cow had no effect on conception up to 12 years of age.

A curious point not easily explained is shown in an analysis of matings according to time of season. In New Zealand in the main dairying districts cows are served about October 1st. It is shown that in the third week in September the index fertility figure for fertile cows and for all cows was considerably higher than for following weeks and definitely higher than for the week before, though the difference then was not quite so great.

Another table of interest is the conception percentage in cows mated from 2–19 weeks after calving. At 2 and 3 weeks the conception

was low, *viz*, 28% and 27%. Thereafter the rate rose to 58–74% at the 15th week, when a slight drop occurred.

Where cows had aborted prior to mating the number of services per conception was no greater than in the normal herd. The number of cows which failed to conceive, however, was greater than in the normal herd, being 10% as against 7% (in the previous year 15% failed to conceive).—C. S. M. Hopkirk.

Tanganyika Territory. (1940). **Department of Tsetse Research. Tsetse Research Report, 1935-1938.** pp. 88. 4 appendixes. Dar es Salaam: Govt. Printer. [8vo] [Shs 5/–].

This is a progress report on the various lines of attack against tsetse flies and Trypanosomiasis in Tanganyika, already described [see *V. B.* **8.** 225]. A considerable extension of the work became possible in 1938, as a result of increased staff and finances, and various new lines of investigation are outlined. A brief account is given of ecological and tsetse survey work and of the progress of reclamation projects.

The part of the report dealing with *Glossina morsitans*, contributed by Jackson, reviews observations on the physiology and ecology of this species, on the seasonal rise and fall of tsetse populations at Kakoma, and on the relation of "fly round" counts, which reflect fly activity, to actual population numbers [see also *V. B.* **9.** 24]. In preliminary observations on the effect of fire exclusion (omission of the customary annual burning of savannah during the dry season) the population of the unburnt areas showed a significant reduction.

The account of work by Potts on *G. swynnertoni*, also includes observations on the effect of fire exclusion. A marked reduction of fly population occurred in the test area, but its significance has not yet been completely established, because of indications that a reduction from climatic causes was taking place during part at least of the observation period (1933–38).

With a view to possible discriminative measures against game animals important for survival of tsetse, observations on the ecological relationships of game, flies, and vegetation are being made. Wart-hogs and giraffes were commonly attacked, but zebras appeared to be unmolested. Field observations are being checked by blood precipitation tests of the gut contents of captured flies. Further observations on the value of thickets as barriers to fly movement have shown that movement, although impeded, is not necessarily prevented by such natural barriers.

Field observations on the ecology of *G. pallidipes* under Kenya coastal conditions, and preliminary work on its control by removal of undergrowth, are described. Complementary ecological observations up country (Shinyanga) yielded inconclusive results. Trapping experiments against *G. palpalis* var. *fuscipes* have been continued. The method appears to become less effective as the fly density decreases. Some observations on the bionomics of *G. brevipalpis* and *G. austeni* are briefly outlined.

The report ends with an account of laboratory studies on the factors causing abnormal reactions of *G. morsitans* in captivity, and a description of experimental work on the mechanism of the effect produced by fire exclusion. There was indication that, consequent on fire exclusion, there is an increase in pupal mortality from predators, principally ants.—J. MacLeod.

French West Africa. (1939). Travaux de recherches effectuées par le laboratoire de Bamako pendant le 1re semestre 1939. **[Report of Research Work at Bamako Laboratory, January-June, 1939].** [Phillippe].—*Bull. Serv. zootech. Epiz. A.O.F.* **2.** No. 4. 69–79.

Experiments were made on the desiccation of the Rinderpest virus, the susceptibility of the rabbit to the disease, the effects obtained by addition of certain products to the vaccine generally used, and the comparative protective value of the plasma and the serum of hyper-immunized animals. Desiccation does not affect the virus nor appreciably lengthen its viability. Contrary to the experiments of Inoue (1935) and Fukusho and Nakamura [*V. B.* **11.** 163.] attempts to transmit this disease to rabbits have failed. The live virus mixed with lanolin and cod liver oil has given satisfactory results, promising an economy of nearly 50% of the pulp.

It has been proved that the red monkey (*Erythrocebus patas*) is receptive to Rabies as well as is *Cynocephalus*. During a small outbreak at Bamako, two strains (still under study) showing unusual virulence were isolated. A phenol vaccine tested on dogs has given good results. The study of various vaccines against Bovine Contagious Pleuro-pneumonia is being continued, *viz*, alum vaccine, saponin vaccine, and lanolin vaccine.

The trematode, *Cotylophoron cotylophorum*, has been found in sheep.

In smears from the conjunctival membrane of sheep spirochaetes and forms resembling *Rickettsia conjunctivae* have been detected. Doses of 0·05 g. atoxyl have been found to give good results against SPIROCHAETOSIS in chickens and to be non-toxic.—L. TOBBACK.

I. EGYPT. (1939). **Annual Report of the Veterinary Service for the Year 1933-1934.** [FARID, A.] pp. v + 178. Bulâq, Cairo; Govt. Press. [8vo] [P.T.5].

II. EGYPT. (1939). **Report of the Veterinary Pathological Laboratory, 1933-1934.** [EL KIRDANY BEY, A. M.]—*Rep. vet. Serv. Egypt, 1933–34.* pp. 15–46.

III. EGYPT. (1939). **Annual Report of the Serum Institute, 1933-1934.** [GUINDI, M.]—*Ibid.* pp. 53–97.

I. Except for one case amongst Sudanese cattle in Cairo abattoir quarantine, no outbreaks of RINDERPEST occurred; the veterinary service continued with the programme of compulsory serum-virus inoculation against this disease. 651 cases of FOOT AND MOUTH DISEASE were reported and restrictions were imposed. Owners were advised to adopt prophylactic measures against HAEMORRHAGIC SEPTICAEMIA, owing to the prevalence of this disease during the flood season. The numbers of cases (or outbreaks) of other diseases reported were :– ANTHRAX 62, BOVINE CONTAGIOUS PLEURO-PNEUMONIA 12, GLANDERS 25, STRANGLES 142, TUBERCULOSIS 4,078, BACILLARY WHITE DIARRHOEA 130, FOWL CHOLERA 20, FOWL TYPHOID 1, FOWL DIPHTHERIA AND POX 1,421, FOWL PLAGUE 864, SHEEP POX 798, TRYPANOSOMIASIS 4, PIROPLASMOSIS 701, SPIROCHAETOSIS 42, RABIES 32, SWINE FEVER 334, and STIFF SICKNESS 42.

Amounts of vaccine and sera issued during the year were :– 476 doses streptococcus antiserum, 1,588 doses tetanus antiserum, 9,209 doses fowl plague vaccine, 18,091 doses fowl diphtheria vaccine, and 1,635 doses fowl cholera antiserum.

II. The work of the laboratory includes :– (a) routine examination of specimens; (b) *ante-* and *post-mortem* examinations and collection of specimens; (c) preparation of biological products—diagnostic, prophylactic, and curative; (d) storage and issue of biological products, and (e) research work. Tables are included to show the various animals from which specimens were received during the year, the nature of the examination performed, and the results of the laboratory investigation. Details of biological products prepared are given. Subjects for research work were :– transmission of contagious diseases by the water supply in Egypt, the dangers of unbalanced nutritional elements in the foods of birds, and bacteriological examination of milk.

III. The institute prepares RINDERPEST virulent blood and serum, carries out experimental investigations as directed by the Scientific Veterinary Committee, tests and acts as a remount depot for newly purchased horses, distributes stores to the veterinary services and, in conjunction with the Veterinary Pathological Laboratory, prepares various antisera enumerated in I.—J. C. WALLACE.

UNITED STATES OF AMERICA. (1939). **New York, State Department of Health. Annual Report of the Division of Laboratories and Research, 1939.** [WADSWORTH, A. B.] pp. 101. Albany, N.Y.: State Department of Health. [8vo].

Experience with desiccation of frozen bacterial cultures emphasized the advantages of this method in the preservation of the biological characters of the different species. The technique for the preparation of extracts for the serological classification of haemolytic streptococci has been simplified by the use of smaller volumes of infusion-free peptone broth for the growth of cultures and by the omission of washing the bacterial cells before extraction with acid.

Several cases of TULARAEMIA were reported in human beings, the infection being contracted from wild rodents, two cases from rabbits, one from a muskrat, one from a fox, one from a deer and one from the bite of a deer fly [? *Chrysops* sp.].

A study was made of NEPHRITIS in horses developing as a result of immunization with toxic injections of bacterial cultures and toxins for the production of therapeutic sera. The changes in the kidneys were (1) acute glomerular congestion, (2) acute diffuse glomerulo-nephritis, and (3) focal or embolic glomerulo-nephritis.

Studies were continued on the application of the phosphatase test to the examination of cream separated from pasteurized milk.

At the Branch Laboratory, New York, there was a considerable increase in the number of brains examined for evidence of RABIES; Negri bodies were found in 41% of the 239 received.

BOOK REVIEWS

GRAY, E. (1940). **Diseases of Poultry. Their Aetiology, Diagnosis, Treatment and Control. With a Section on the Normal Anatomy and Physiology of the Fowl.** pp. 198. London: Crosby Lockwood & Son, Ltd. [8vo] [9s. 6d.]

It is difficult to assess the real purpose of this book, which appears in its main treatment to fall between two stools. It is too involved in parts for a semi-popular work, and insufficiently accurate to be classed as a scientific text-book.

If it is intended primarily for poultry owners, too much space has been given up to detailed descriptions of technicalities, such as the Ziehl-Neelsen method of staining and the table of blood counts for various pathological conditions, while a large part of the sections on anatomy, physiology, and general and special pathology might well be dispensed with. For the scientific worker or student in veterinary science these subjects are more adequately dealt with in standard text-books.

The book has not been well edited and inaccuracies have been allowed to occur. For example, plate 24, titled "Fowl Pox", illustrates a lesion of the eye usually associated with contagious coryza, and not caused by the virus of fowl pox. In dealing with the same disease, the author states that a vaccine consisting of a powder which is rubbed into the feather follicles may be obtained from the Veterinary Laboratory of the Ministry of Agriculture at Weybridge. This vaccine has of course always been issued as a 1% suspension of dried pigeon pox virus.

Some of the statements and generalizations will not receive universal acceptance, and it is to be regretted that there is a tendency in dealing with certain diseases, particularly lymphomatosis and coccidiosis, to stress the author's own theories rather than those supported by scientific evidence.

The sections dealing with hygiene and sanitation, and with the specific diseases of poultry, are the best parts of the book, and contain some useful information for poultry farmers. The work is well produced and the illustrations are good. The subjects are dealt with in the following sequence:– anatomy, physiology, hygiene and sanitation, general pathology, special pathology, specific diseases, and parasitic diseases. There is a preface and index, and a final chapter on the practical application of the work.—R. F. GORDON.

PELTIER, G. L. [Professor of Bacteriology, University of Nebraska], GEORGI, C. E. [Assistant Professor Bacteriology], & LINDGREN, L. F. [Instructor in Bacteriology]. (1939). **Laboratory Manual for General Bacteriology.** pp. viii + 279. New York: John Wiley & Sons, Inc.; London: Chapman & Hall. [2nd Edit.] [4to] [12s.]

The book is intended as a guide for students in general bacteriology. It is set out in a number of exercises which have been designed to meet the requirements of students studying agriculture, pre-medical, pharmacy, dental, and other subjects. From the instructional point of view the authors have attempted to cover in broad outline a subject in which attention to detail is essential. Much of the teaching and demonstration of the bacteriological technique is left to the instructor and no attempt is made to give suitable explanation in the text. There is no doubt that this omission is intentional and the book may be recommended more as a teaching guide than as a guide to students. The appendix of formulae of staining methods, reagents, and culture media is also to be recommended.—E. C. HULSE.

I. CHITWOOD, B. G., & CHITWOOD, M. B. (1938). **An Introduction to Nematology. Section I. Part II.** pp. 55–123 Babylon, N.Y.: The Authors. [4to] [$3.00]. [For section I, part I, see *V. B.* **7.** 660].

II. CHITWOOD, B. G., CHITWOOD, M. B., WALTON, A. C., JACOBS, L., CHRISTENSON, R. O., & WALLACE, F. G. (1940). **An Introduction to Nematology. Section I. Part III. Section II. Part I.** pp. 125–240. Babylon, N.Y.: The Authors. [4to] [$4.50].

Section I, part II deals with cephalic structures and stoma, the oesophagus including the oesophago-intestinal valve, the oesophago-sympathetic system, the finer structure of the oesophagus, the intestine, and the posterior gut.

Section I, part III is devoted to the excretory, reproductive, and nervous systems, oviparity, ovoviviparity and special morphology of the eggs. Nematode relationships are discussed under the headings of past theories, the primitive nema, distribution, geology, host groups, comparative anatomy, and relationship with other groups, the latter section containing a chart which shows the main differences between the

Nematoda and other groups of metazoan invertebrates.

Section II, part I is devoted to gametogenesis, embryology, and post-embryonic development.

It is hardly possible to do justice to these books in a short review, but it is obvious that a great deal of painstaking research has gone into their production. The first sections compose in reality a text-book of nematode anatomy and the various topics are discussed in great detail. The text is supplemented by hundreds of beautiful camera lucida sketches which facilitate the reading. Very extensive bibliographies given at the end of each chapter enhance the value of the book. Research workers in helminthology will find much to interest them and plenty of incentive for further research.—A. L. WILSON.

WEBSTER, J. H. D. [M.D., F.R.C.P.E., F.F.R., Honorary Director, Meyerstein Institute of Radiotherapy, Middlesex Hospital, London]. (1940). **The Periodicity and Cause of Cancer, Leukaemia and Allied Tumours with Chapters on their Treatment.**—pp. xv + 178. 5 plates. London: Baillière, Tindall & Cox. [4to] [12s. 6d.]

This book is the first systematic study of the periodicity of cancer, a subject on which there has been little research since 1905 when BASHFORD first noted a rhythm in the growth of some animal tumours and other workers recorded the alternation of active and quiescent phases in human cancer.

The studies forming the subject matter of this book began with the discovery in December 1937 that a patient had had breast cancer recurrences on five occasions at approximately 33-week intervals. This interval was later found to be the standard period between active phases of growth. Half-periods of approximately 16½ weeks also occur, as do various combinations of standard and half-periods. This periodicity applies to carcinoma, sarcoma, some benign tumours, Hodgkin's disease, and leucaemia.

Treatment, such as surgery or radiotherapy, may postpone or abolish the periodicity, but if recurrences occur after cessation of treatment the original periodic rhythm returns. The alternatives appear to be cure or periodicity.

The theory is supported by statistical evidence, including prediction of the time of recurrences in patients.

The theory of periodicity supports the view of viruses as a cause of neoplasia, and in neoplasms during the active phase, elementary bodies are considerably more numerous both within cells and free in the tissues than during periods of quiescence.

Applications of the theory to therapy include the use of X-ray or radium therapy during the active phase and the prediction of the time of recurrences.

This book is one which deserves careful study and confirmation by other workers. It might be possible to test the theory on malignant tumours in animals, particularly where a large number of dogs affected with neoplasia are available. It would be expected that the standard period would be shorter and care would have to be taken so that the active phases were not missed. The facilities for observing treated and untreated cases in dogs and the continuance of the observations under more or less experimental conditions should make such a study well worth while.

The book is clearly written, well illustrated by charts, tables and photographs, and forms a valuable contribution to the study of cancer. —E. G. WHITE.

ALSTEAD, S. [Edited by] [M.D., Liverp., M.R.C.P., Lond., Fellow of the Royal Faculty of Physicians and Surgeons. Pollok Lecturer in Materia Medica and Therapeutics in the University of Glasgow. (1940). **Poulsson's Text-Book of Pharmacology and Therapeutics.** pp. xi + 557. 1 appendix. London: William Heinemann (Medical Books) Ltd. [3rd Edit.] [8vo] [21s.]

In preparing the new edition of this book the editor has borne in mind the view expressed by Professor DIXON in an introduction to a previous edition, *viz*, " Those portions of the work which deal with therapeutics form, in my opinion, the outstanding feature. The pharmacology is often but a prelude of this ". In the present edition little space has thus been devoted to some recent work, *e.g.* on vitamins and sex hormones, and it is therefore all the more unfortunate that the little given is by no means always accurate. Nor is the remainder of the book consistently reliable. The dose of picrotoxin is given as 1–3 mg. two to three times daily after meals as pills, used in conditions such as chorea and convulsions in children; no mention is made of the possible use of the drug in barbiturate poisoning. There is an appendix which deals with the sulphonamides and with the second Addendum (1940) to the British Pharmacopoeia (1932).—J. M. ROBSON.

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The publication of *Index Veterinarius* commenced with the indexing of the literature of 1933. It is a complete index of current publications relating to veterinary research, public health, administration, education and other aspects of veterinary science.

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